Low-Effect Habitat Conservation Plan
for Bay Checkerspot Butterfly and Serpentine Endemic Plant Species
in Santa Clara County, California

Los Esteros Critical Energy Facility
San Jose, California
03-AFC-2

Prepared for

Los Esteros Critical Energy Facility, LLC

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Executive Summary

Los Esteros Critical Energy Facility (LECEF), LLC (Applicant), has obtained a license from the California Energy Commission (CEC) to continue operation of the LECEF, a 180 MW natural gas power plant in San Jose, California, which consists of four simple-cycle combustion turbine generators and associated equipment. LECEF, LLC is currently seeking a CEC license to convert the LECEF to combined-cycle operation that would involve the addition of four heat recovery steam generators (HRSGs), one steam-turbine generator (STG), a six-cell cooling tower, and ancillary equipment, resulting in a total nominal generating capacity of 320 MW.

Nitrogen deposition from this power plant has the possibility to adversely affect serpentine endemic wildlife and plant species including the federally threatened Bay checkerspot butterfly (*Euphydryas editha bayensis*) and the federally endangered coyote ceanothus (*Ceanothus ferrisae*), Metcalf Canyon jewel-flower (*Streptanthus albidus* ssp. *albidus*), Santa Clara Valley dudleya (*Dudleya setchellii*) and the Tiburon paintbrush (*Castilleja affinis* ssp. *neglecta*). This Habitat Conservation Plan (HCP) has been developed to quantify the maximum potential for nitrogen deposition resulting from the LECEF, to develop appropriate preservation measures to offset possible adverse impacts and to procure an incidental take permit under Section 10(a) of the Endangered Species Act. The Applicant requests coverage by the 10(a)(1)(B) permit for long-term operation of the LECEF for 50 years, the estimated useful life of the facility.

Construction and operation will not result in direct impacts to the Bay checkerspot butterfly or serpentine bunchgrass ecosystems. However, cumulative impacts associated with atmospheric nitrogen deposition to the Bay checkerspot butterfly may represent a possible indirect impact to these resources and have been conservatively estimated as the equivalent of 40 acres of serpentine bunchgrass habitat. A conservation area of this size, designated as the LECEF Ecological Preserve, has been created during the previous licensing of the LECEF simple-cycle facility as described in this HCP.

The biological goals for the proposed HCP are as follows:

- To minimize to the maximum extent practicable the potential take of Bay checkerspot butterfly and federally listed serpentine plants that could result from nitrogen deposition during operation of the LECEF.
- To protect, manage, and maintain the existing habitat for Bay checkerspot butterfly and federally listed serpentine plants at the LECEF Ecological Preserve.
- To protect populations of Bay checkerspot butterfly and federally listed serpentine plants at the LECEF Ecological Preserve.

To accomplish the first goal, this HCP proposes to formally designate an existing 40-acre property established during the initial licensing of the LECEF facility as a permanent preservation area for Bay checkerspot butterfly and federally listed serpentine plants. It will

also describe funds already set aside as an endowment for management of the conservation area in perpetuity.

To accomplish the second goal, management of the conservation area will include monitoring for plant composition, non-native grass cover, invasive weed populations and cover, and butterfly host and nectar and serpentine endemic plant populations, cover, and vigor. Furthermore, conservation area managers will minimize the spread of invasive weeds and non-native annual grasses in locations where they may have negative effects on the host and nectar plants for butterflies and on the listed endemic plants. This objective will be accomplished through a cattle grazing lease with closely controlled grazing on the 40-acre preservation area for the life of the LECEF (50 years).

The final goal will be accomplished by monitoring the populations of Bay checkerspot butterflies and the federally listed serpentine plants on the LECEF Ecological Preserve. This information will be integrated with data from adjacent and nearby butterfly conservation areas to help make sound decisions for specific management of the LECEF Ecological Preserve and for the overall management of the designated Critical Habitat and other suitable areas for these listed species.

The LECEF Ecological Preserve is located on Coyote Ridge in the Santa Clara Valley, approximately 4,500 ft. northwest of the junction of Highway 101 and Coyote Creek Golf Drive. The site is part of a larger property, owned by Castle & Cooke, Inc., which spans a portion of the Coyote Ridge from the Anderson Reservoir to Highway 101. It is Applicant's understanding that Castle & Cooke intends for the approximately 4,300 acre property to eventually be converted to a preserve. To date, approximately 1,421 acres of land in 11 parcels have been converted to a preserve (refer to Figure A-1 in Appendix A).

The primary management strategy to meet the goals and objectives of the HCP is to use cattle grazing to control annual grassland vigor and expansion so as to maintain habitat for the Bay checkerspot butterfly host and nectar plants. This approach will also favor conservation of federally-listed endemic serpentine plants that may be present on the LECEF Ecological Preserve.

Monitoring will be conducted to assess grassland and host and nectar plant conditions as well as Bay checkerspot butterfly populations. The plant surveys will also be done to determine if any of the federal-listed endemic serpentine plants are present on the LECEF Ecological Preserve and the locations of these populations. Management activities will be modified as indicated by the monitoring results to favor conditions for the listed species covered under this HCP.

SECTION 1

Introduction

1.1 Background

The Los Esteros Critical Energy Facility (LECEF) LLC, a wholly-owned subsidiary of the Calpine Corporation, obtained a license from the CEC to continue operation of its 180 MW natural gas power plant (identified as Phase 1 of the project). Calpine is also seeking a license to convert the LECEF to a combined-cycle operation that will result in a total nominal generating capacity of 320 MW (identified as Phase 2 of the project). The project is located in north San Jose, Santa Clara County (Figures 1 and 2).

Atmospheric nitrogen produced from man-made facilities has recently become a concern of resources agencies in the south Bay Area region. The Bay Area air basin has relatively high levels of atmospheric nitrogen in the form of oxides of nitrogen (NOx), which are produced mainly by fuel combustion in vehicle engines and industrial processes (Air Resources Board [ARB] 1986). Nitrogen oxides are thought to convert to particulate nitrogen (ammonium and nitrates) that can leave deposits on soils. When deposited, some of this nitrogen is available for absorption by plants. The fertilization of soils by this deposition process may facilitate the rapid growth of non-native species. This is of most concern in serpentine grassland habitats, or, grassland located on soils derived from serpentine rock. These soils are found in limited areas northeast, southeast, and south of the LECEF site. These serpentine grassland habitats are naturally limited in soil nitrogen. The U.S. Fish and Wildlife Service (USFWS) and the California Energy Commission (CEC) have stated that nitrogen emissions from cars, industrial sources and power plants have led to degraded conditions in serpentine grassland ecosystems. It is believed that the changes caused by these emissions may adversely affect serpentine endemic wildlife and plant species including the federally threatened Bay checkerspot butterfly (*Euphydryas editha bayensis*) and the federally endangered coyote ceanothus (*Ceanothus ferrisae*), Metcalf Canyon jewel-flower (*Streptanthus albidus* ssp. *albidus*), Santa Clara Valley dudleya (*Dudleya setchellii*) and the Tiburon paintbrush (*Castilleja affinis* ssp. *neglecta*). This Low-Effect Habitat Conservation Plan (LE HCP) has been developed to quantify the potential for nitrogen deposition resulting from the LECEF, develop appropriate preservation measures, and procure an incidental take permit under Section 10(a) of the Endangered Species Act.

In the analysis of the Los Esteros Critical Energy Facility (Phase 1) power plant license application (LECEF, 01-AFC-12), the CEC considered the potential indirect effects of nitrogen deposition on serpentine endemic plant and invertebrate species, including the Bay checkerspot butterfly. The CEC Staff considered that several air pollutants, including oxides of nitrogen and ammonia slip, may react in the atmosphere to form agents, such as HNO_3, capable of stimulating plant growth. Emissions of these nitrates from LECEF could deposit on areas of serpentine rock outcrops several miles south of the LECEF, possibly stimulating the growth of non-native plants in areas of serpentine-derived soils that contain endemic species. The Staff expressed a concern that, if nitrates from the power plant were to stimulate non-native plant growth, this may have the indirect effect of discouraging growth

of native plants, some of which are rare serpentine endemic plants, and some of which are host plants for the federally threatened Bay checkerspot butterfly.

In their Final Staff Assessment (FSA), CEC Staff's conclusion was that "the project may have minor effects on the soils that support the host plants for these butterflies, but the cause-and-effect to show an indirect impact was occurring would be difficult to prove for several reasons" (CEC 2004, page 4.2-20). These reasons included the distance between the power plant and the area of potential impact, the number other nitrate sources in the intervening area, and the very conservative nature of the air impact modeling. Staff addressed the issue of air emission effects on the Bay checkerspot butterfly and other serpentine endemics as a potential cumulative effect and concluded that the LECEF could harm state and federally listed species, in conjunction with two other planned new power plants. That is, they concluded that the LECEF could be seen as having a potential effect on these species on a regional basis, and cumulatively with other sources of nitrate deposition. The Commission's Final Decision in the LECEF proceeding required that the Applicant "purchase and manage lands for the benefit of the species thereby reducing any potential adverse impact to a level that is less than significant" (CEC, 2005, page 203).

Continued operation of the LECEF Phase 1 project will not result in any increase of nitrogen emissions from the facility. As an environmental enhancement, the Applicant has implemented a conservation program to participate in reducing the potential harm to the Bay checkerspot butterfly and other endemic species that reside in the serpentine bunchgrass ecosystem. Operation of LECEF Phase 2 is expected to produce nitrogen emissions that represent an increase of approximately 15 percent over existing levels. Though Phase 2 operation would cause an increase in nitrogen deposition, the connection between nitrogen deposition from power plants and the potential degradation of the Bay checkerspot butterfly's habitat is not clearly established for the reasons listed above. Furthermore, the conservative nature of the previous Phase 1 nitrogen deposition analysis and the provision of environmental enhancement in the absence of a clear significant impact suggests that even with this increase in nitrogen deposition from Phase 2, there will be no significant, unmitigated impacts.

The Applicant has purchased 40 acres of critical serpentine bunchgrass ecosystem habitat in the Coyote Ridge area, has dedicated this land to the Land Trust for Santa Clara County and has established an endowment fund to manage the donated land in perpetuity for the conservation of these sensitive species. Phase 1 would thus have no significant adverse impact on the Bay checkerspot butterfly or serpentine bunchgrass ecosystem.

Condition 35 of the CEC Preliminary Determination of Compliance (PDOC)[currently in production] requires LECEF, LLC. to provide 27.945 tons/year of NOx Emission Reductions Credits (ERCs) prior to the issuance of the Authority to Construct. To date, NOx ERCs equivalent to 29.029 tons/year have been banked for the LECEF project and will be surrendered to BAAQMD prior to construction. These NOx ERCs are intended to offset potential nitrogen deposition impacts so that construction and operation of the Phase 2 LECEF would have no significant adverse impact on listed plant species in serpentine bunchgrass habitats.

Figure 1. General Vicinity

Figure 2. Site Location

In a meeting on September 21, 2004 between CEC staff, USFWS staff and representatives of LECEF, the USFWS indicated that LECEF could be a good candidate for a low-effect determination. Low-effect determinations can only be issued to projects that have minor or negligible effects on federally listed, proposed or candidate species and the habitat, and minor or negligible effects on other environmental values or resources. Consequently low-effect HCPs are given categorical exclusion under the National Environmental Policy Act (USFWS 1996).

1.2 Need for an Incidental Take Permit

The Applicant is requesting an Incidental Take Permit for the possible indirect effects of nitrogen deposition on the federally threatened Bay checkerspot butterfly due to operation of the LECEF. The deposition of nitrogen from all emission sources including cars, industrial sources and power plants (such as the LECEF), is known to facilitate growth of non-native grasses that can out-compete host food plants and nectar plants for the Bay checkerspot butterfly larvae and adults respectively, as well as the four federally endangered plants. It is postulated that the loss of host plants and nectar plants for the Bay checkerspot butterfly in serpentine habitats (due to increased presence of non-native grasses) could, over time, contribute to a decline of the local Bay checkerspot butterfly population. Likewise, an increase in non-native grass populations, especially if not managed effectively, will reduce habitat suitability for the four federally listed plants and could contribute to declines in local populations of these species. Therefore, the Applicant seeks an incidental take permit for Bay checkerspot butterfly. Under section 9(a)(2)(B) of the ESA, endangered plants are protected from removal, reduction to possession, and malicious damage or destruction in areas that are under federal jurisdiction. Section 9(a)(2)(B) of the ESA also provides protection to plants from removal, cutting, digging up, damage, or destruction where the action takes place in violation of any state law or regulation or in violation of a state criminal trespass law. The Applicant also intends to request inclusion of the four federally listed plants (USFWS 1996). Preservation and management of serpentine habitat in the Bay Area would also benefit these plants.

1.3 Regulatory Framework

1.3.1 Federal Endangered Species Act

The Endangered Species Act (ESA) was passed by the United States Congress to protect various species of plants, invertebrates, fish, and other wildlife from extinction. Section 9 of the ESA prohibits the "take" of any fish or wildlife species listed under the ESA as endangered and most species listed as threatened, unless such take is specifically authorized by the USFWS. Under federal regulation, take of fish or wildlife species listed as threatened is also prohibited unless authorized. "Take" is defined in the ESA as follows: "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Harm is further defined to mean "an act which actually kills or injures wildlife" and can include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3). Harass is further defined as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it

to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (40 CFR 17.3).

In the 1982 amendments to the ESA, Congress established a provision in Section 10 that allows for the "incidental take" of endangered and threatened species of wildlife by non-Federal entities. Incidental take is defined by the ESA as take that is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity". The process to permit "incidental take" was established under Section 10(a)(1)(B) of the ESA. Under this provision, the Secretary of the Interior and Secretary of Commerce may, where appropriate, authorize the taking of federally listed fish or wildlife, if such taking occurs incidentally during otherwise legal activities. The Secretaries of Interior and Commerce subsequently charge the Directors of the USFWS and National Oceanographic and Atmospheric Administration Service (NOAA Fisheries), respectively, with regulating the taking of listed species under their jurisdiction by virtue of their joint authority under the ESA. NOAA Fisheries has jurisdiction over anadromous fish species, and USFWS has jurisdiction over all other fish and wildlife species.

Because the operation of LECEF may result in observable and measurable harm, LECEF, LLC, is requesting that the Service issue an incidental take permit because the emissions from the LECEF possibly may result in the incidental take of Bay checkerspot butterfly (*Euphydryas editha bayensis*) through indirect habitat modifications. A Habitat Conservation Plan (HCP) must be submitted with the Section 10(a)(1)(B) permit application because it provides the technical information needed by the Service to issue the permit. This HCP was prepared to minimize possible adverse effects on Bay checkerspot butterfly populations and serpentine habitat by management of an ecological preserve funded in perpetuity. The purpose of this ecological preserve is to ensure the protection of individual Bay checkerspot butterflies and also to protect any populations of the four Federally-listed plants that might occur on the preserve through preservation and management of the non-native grasses.

For projects with relatively minor or negligible effects to listed species, the Service has established a special category referred to as low-effect HCP. Based on consideration of the criteria provided in the Habitat Conservation Planning Handbook (USFWS 1996), this project is expected to qualify as low-effect. Low-effect HCPs involve minor or negligible effects on federally listed, proposed, or candidate species and their habitats covered under the HCP; and minor or negligible effects on other environmental resources. Low-effect HCPs and their associated incidental take permits, despite authorization of some small level of incidental take, individually and cumulatively have a minor or negligible effect on the species covered in the HCP.

The determination of whether an HCP qualifies for the low-effect category is based on its anticipated impacts prior to implementation of any minimization and mitigation measures. This determination is made by the USFWS based on the information provided by the Applicant in the *Screening Form for Low-Effect HCP Determinations.* The purpose of the low-effect HCP is to expedite handling of HCPs for projects with inherently minor impacts, not for projects with significant potential impacts that are subsequently reduced through mitigation programs.

Section 7 of the Act requires all Federal agencies to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any species listed

under the Act or result in the destruction or adverse modification of the habitats used by these species. Because the issuance of an incidental take permit to a non-federal entity, such as LECEF, LLC, constitutes a federal action, the USFWS must conduct an internal Section 7 consultation, following their receipt of this HCP for formal processing and review. Section 7 requires consideration of several factors not explicitly required by Section 10, in particular, it requires consideration of the project's indirect effects, as well as the effects on federally listed plants and on critical habitat. The USFWS internal consultation results are summarized in a Biological Opinion prepared by them regarding whether implementation of the HCP will result in jeopardy to any listed species or adversely modify critical habitat.

1.3.2 Habitat Conservation Plan Requirements and Guidelines

The Section 10 process for obtaining an incidental take permit has three primary phases: (1) the HCP development phase; (2) the formal permit processing phase; and (3) the post-issuance phase.

During the HCP development phase, the project applicant prepares a plan that integrates the proposed project or activity with the protection of listed species. An HCP submitted in support of an incidental take permit application must include the following information:

- A description of the impacts that are likely to result from the proposed taking of the species for which permit coverage is requested
- A description of the measures that will be implemented to monitor, mitigate for, and minimize impacts; as well as the funding that will be made available to undertake such measures and the procedures that will be used to deal with unforeseen circumstances
- Alternative actions considered that would not result in "take" of a listed species
- Additional measures the USFWS may require as necessary or appropriate for purposes of the HCP

In 1996, the USFWS and NOAA Fisheries issued the *Endangered Species Habitat Conservation Planning Handbook* to summarize revised guidelines to streamline and expedite the HCP permit process. As part of the expedited process, the USFWS established a procedure for developing 'low-effect' HCPs. For projects to qualify for a low-effect HCP, they can only have minor or negligible effects on federally listed, proposed, or candidate species and their habitats, and minor or negligible effects on other environmental resources. Even though the take permits allow for some small level of incidental take, the individual and cumulative effects from the implementation of low-effect HCPs can only have a minor or negligible effect on the species covered in the HCP. The determination of whether an HCP qualifies for the low-effect category is based on the anticipated impacts of the project prior to implementation of the mitigation plan as judged by information provided to the USFWS.

On September 21, 2004, CEC Staff and LECEF representatives met with the USFWS to discuss the possibility of the LECEF being eligible for a low-effect HCP. It was tentatively agreed at that time that the project would qualify based on the relatively minor impacts to federally listed species. This tentative conclusion is supported by an agreement already reached for a similar project in the area, the Pico Power Project (see Figure 1) that is currently undergoing Section 10 consultation, which has been determined to be eligible for a low-effect HCP. Based

on the September 21, 2004 meeting, LECEF LLC drafted a *Screening Form for Low-Effect HCP Determinations* and submitted it to the USFWS for their approval along with an *Environmental Assessment Summary* (these documents are included as Appendix B).

The permit processing phase begins with the submission of a complete application package, including an HCP, a permit application, and a fee ($25) from the Applicant. The USFWS must then complete the following:

- Publish a Notice of Receipt of a Permit Application in the Federal Register
- Conduct a formal Section 7 consultation and prepare a Biological Opinion
- Prepare a Set of Findings that evaluates a Section 10(a)(1)(B) permit application in the context of permit issuance criteria found within Section 10(a)(2)(B) of the ESA
- Prepare an Environmental Action Memorandum, a brief document that serves as the Service's record of National Environmental Policy Act compliance for categorically excluded actions (see below)

A Section 10 incidental take permit is granted upon a determination by USFWS that all requirements for permit issuance have been met. Statutory criteria for issuance of the permit require the following:

- The permitted take will be incidental to otherwise lawful activities
- The incidental take will not appreciably reduce the likelihood of survival and recovery of the species in the wild
- The impacts resulting in the incidental take will be minimized and mitigated to the maximum extent practicable
- The HCP has adequate funding for implementation and the USFWS has received assurances, as may be required, that the HCP will be implemented
- There are procedures to identify and address unforeseen circumstances

During the post-issuance phase, the permittee and other responsible entities (such as a land management trust) implement the HCP. In the case of LECEF, the Land Trust for Santa Clara County is managing the existing LECEF preserve. The USFWS, and in the power plant licensing cases the CEC, are responsible for monitoring the permittee's compliance with the HCP and the terms and conditions of the permit. The USFWS is also responsible for notifying the public about the permit issuance through a Federal Register notice.

1.3.3 National Environmental Policy Act

The National Environmental Policy Act (NEPA) passed in 1969, as amended, requires that Federal agencies analyze the environmental impacts of their actions and include public participation in the planning and implementation of their actions. The NEPA process helps federal agencies make informed decisions with respect to the environmental consequences of their actions, and ensures that measures to protect, restore, and enhance the environment are integrated with those actions. The NEPA process ensures that measures to protect, restore, and enhance the environment are included, to the degree practicable, as a component of their

actions. Depending on the scope and impact of an HCP, NEPA requirements can be satisfied by one of the three documents or actions: 1) a categorical exclusion; 2) and Environmental Assessment (EA); or 3) an Environmental Impact Statement (EIS).

An Application for Certification (AFC) was prepared for the LECEF project. Based on that application the CEC has issued a license for Phase 1 of the LECEF project, has issued a Preliminary Staff Assessment (PSA) for Phase 2 of the Project, and is close to issuing a Final Staff Assessment (FSA) for Phase 2. The CEC considers the FSA to be the functional equivalent of an EIR under the California Environmental Quality Act. This permit process closely parallels the NEPA process in that impact assessments and mitigation measures are developed for various natural resources and these documents are submitted for regulatory and public review and comment.

1.4 Activities Covered by Permit and Plan Duration

The Applicant requests coverage under the 10(a)(1)(B) permit (referred to as the "covered activities") for the operation of the LECEF (for the estimated project life of 50 years) and implementation of the requirements of this HCP.

1.5 Species to be Covered by this HCP

The species covered by this HCP include the federally threatened Bay checkerspot butterfly (*Euphydryas editha bayensis*), as well as four federally endangered plant species: the coyote ceanothus (*Ceanothus ferrisae*), Metcalf Canyon jewel-flower (*Streptanthus albidus* ssp. *albidus*), Santa Clara Valley dudleya (*Dudleya setchellii*), and the Tiburon paintbrush (*Castilleja affinis* ssp. *neglecta*). Since the take prohibitions for plants are more limited than for fish and wildlife, take of the three listed plants cannot be authorized under the incidental take permit; however, the plant species would be included on the permit in recognition of the conservation benefits provided to the species under the HCP. Assurances provided under the "No Surprises" rule at 50 CFR 17.3, 17.22(b)(5), and 17.32(b)(5) would extend to the all five Covered Species.

1.6 Organization of this HCP

This HCP is divided into five sections that are generally based on the Habitat Conservation Planning Handbook (USFWS 1996). Section 1 is the introduction. Section 2 describes the proposed project. Section 3 describes the biological setting within the project area and discusses the legal status of the Bay checkerspot butterfly and four federally listed serpentine plant species, as well as describing their distribution and life histories. Section 4 describes the potential effects of the project on serpentine endemic species and provides as assessment of the level of "take" on these species from the LECEF. Section 5 provides the conservation strategy for the serpentine endemic species, including the biological goals and objectives that would result from the implementation of the HCP, including responsibilities, management plan, and monitoring. Section 6 describes the responsibilities of the Applicant and provides a discussion of the funding for the endowment that will be used to manage the Preserve in perpetuity. Section 7 describes the project alternatives analyzed. Section 8

discusses changed and unforeseen circumstances. Section 9 provides the references and literature consulted in preparation of the HCP.

SECTION 2

Project Description

2.1 Project Description

2.1.1 Project Location and Zoning

The LECEF site is located in Township 6S, Range 1W (USGS Milpitas 7.5-minute quadrangle) in the City of San Jose, Santa Clara County, California (see Figures 1 and 2). The facility (Phase 1 and 2) is located within a 21-acre project site that is contained within a 34-acre project parcel. The project parcel also includes a vacant 13-acre parcel to the south of the project site that will be used for laydown and worker parking during the construction of Phase 2. The project parcel is immediately north of State Route 237 and east of Zanker Road (See Figures 1 and 2).

To the east of the project parcel are an agricultural field, Coyote Creek, and the City of Milpitas. Immediately to the north of the parcel is the existing Silicon Valley Power (SVP) 230 kV Switching Station. North of the SVP Switching Station is the existing PG&E Los Esteros Substation. West and further north of the project site are open and undeveloped buffer lands surrounding the San Jose/Santa Clara Water Pollution Control Plant (WPCP). The WPCP is northwest of LECEF. Further north are the WPCP sludge drying ponds and yards.

2.1.2 Brief Project Summary

Phase 1 of the LECEF is a nominal 180-megawatt (MW) natural gas-fired, simple-cycle peaking facility. The facility's interconnection involves a wooden-pole line connecting the LECEF switchyard with the PG&E 115 kV Los-Esteros-Nortech line along the west side of the facility. The LECEF project description is provided in detail in Appendix E and is also found in Chapter 2 of the LECEF Application for Certification (AFC; LECEF LLC 2003). LECEF Phase 1 includes the following components:

- Four General Electric LM6000 SPRINT combustion turbine generators (CTGs) equipped with water injection to control oxides of nitrogen (NOx) emissions, water injection for power augmentation, and associated auxiliary equipment. Carbon monoxide (CO) emissions are controlled in the CTG combustors through good combustion practices. Each CTG generates a nominal 45 MW.
- Selective catalytic reduction (SCR) and oxidation catalyst units for further NOx and CO emissions reduction. These are housed in four HRSG casings that were installed during Phase 1 in anticipation of the Phase 2 installation of steam generator tubing and other combined-cycle equipment.
- A one-cell cooling tower for plant equipment cooling.
- A 10-inch-diameter, 550-foot-long natural gas pipeline that connects to existing PG&E lines 101 and 109, both of which are located adjacent to State Route 237.

- One 18-inch-diameter, 1,500-foot-long recycled water pipeline that connects with the South Bay Water Recycling Program's (SBWRP's) recycled water main, located within the City of San Jose's buffer land west of the project site.
- An 18-inch-diameter 2,000-foot-long waste water pipeline connecting LECEF with the City's sanitary sewer line located in Zanker Road.
- A 1,000-foot-long storm water drain that connects LECEF to an existing 24-inch diameter outfall, located to the east of the site at the flood control channel adjacent to Coyote Creek.

The LECEF Phase 2 project involves a conversion of the existing facility to combined-cycle operation. The resulting facility will have a nominal 320 MW generating capacity. This HCP covers Phase 2. The combined-cycle conversion will be accomplished through the addition of several key components:

- HRSG tubes, evaporator drums, piping and associated equipment (casings for the HRSGs were licensed and installed as part of Phase 1)
- HRSG duct burners
- One nominal 140 MW steam turbine generator
- A deaerating surface condenser
- A six-cell mechanical-draft, plume-abated evaporative cooling tower
- Circulating water pumps
- Boiler feedwater pumps
- Water treatment facilities
- Steam turbine generator step-up transformer
- Electrical equipment enclosure and accessories for combined-cycle configuration
- Cycle blowdown tanks
- Two 115:230 kV step-up transformers

Electrical generation will be at 13.8 kilovolts, which will be stepped up to 115 kV and sent to the LECEF switchyard. In the switchyard, the power will be stepped up to 230 kV through the two transformers and sent via two aerial 230 kV 200-foot long transmission lines to the SVP 230 kV Switching Station, located immediately north of the existing LECEF switchyard.

The total facility generation capacity (Phases 1 and 2 combined) is expected to be approximately 320 MW upon completion of Phase 2.

In accordance with the CEC permitting requirements for Phase 1 of the LECEF, mitigation and avoidance measures were followed as detailed in the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) (CH2M HILL 2002). In addition, the permit applications (i.e., U.S. Army Corps of Engineers 404 permit and California Fish and

Game Streambed Alteration Agreement) for upgrading the stormwater outfall, completed as part of Phase 1, also included measures to avoid impacts to sensitive species. Mitigation and protection measures developed for the BRMIMP will continue to be implemented (and updated as necessary) during the additional Phase 2 construction at the LECEF site.

SECTION 3

Biological Setting

3.1 Regional Biological Resources

The LECEF facility is located in the northern end of the Santa Clara Valley, which historically contained various habitats including riparian woodlands, willow riparian woodlands, sycamore alluvial woodlands, emergent and vernal pool wetlands, and annual and perennial grasslands. Oak woodland, coastal sage scrub, and serpentine bunchgrass dominate the surrounding hills. Current land use is dominated by urban commercial/industrial development, freeways, and urban residential development with vegetation communities consisting primarily of horticultural (landscape) trees and shrubs. Other plant community types in the immediate project area include an urban riparian corridor along Coyote Creek, and active and fallow agricultural areas. Sewage sludge drying ponds are found north of the project area.

Regional parks, creeks, rivers, and open space areas, including Critical Habitat areas support biological resources within the urbanized South Bay Area (Figure 3). The USFWS has designated approximately 18,293 acres of serpentine grassland as Critical Habitat for the Bay checkerspot butterfly, with 13 units within San Mateo and Santa Clara counties. The closest Critical Habitat unit to the project areas is the Metcalf Unit (11.6 miles to the southeast) (Figures 3 and 4). The LECEF Preserve is within the Kirby Critical Habitat Unit as designated by the USFWS (Figure 4).

3.2 Characteristics of the Project Site and Surrounding Lands

The LECEF is located within an agricultural/urbanized part of the City of San Jose. Elevation of the project site is approximately 4.6 meters (15 feet). Biological habitats within the project site consist primarily of the developed urban landscapes on the LECEF site with limited landscape trees and shrubs along with the existing power plant and associated equipment. The LECEF site is surrounded by the other previously discussed energy developments to the north and west and open agricultural fields to the east. Highway 880 is located east of Coyote Creek along the city of Milpitas. A north-south trending riparian corridor associated with Coyote Creek is located east of the LECEF site beyond an earthen levee maintained by the Santa Clara Valley Water District (SCVWD) for flood control. Further north, the land is occupied by sludge drying ponds and other facilities of the WPCP before transitioning to the southern portions of the San Francisco Bay. The lands to the south of the site consist primarily of heavily urbanized areas and freeways with habitats limited to horticultural plantings.

As described in the Biological Resources section of the LECEF Application for Certification (AFC) (Section 8.2) (LECEF LLC 2003), no sensitive biological habitats or wetlands and

waters of the U.S. occur on the project site. Additionally, the project site does not contain habitats known to support special-status species.

The nearest water of the U.S. to the LECEF site is Coyote Creek, which is located approximately 700 to 1,000 feet east of the site on the opposite side of a levee managed by SCVWD. The Coyote Creek channel has been modified by straightening and grading and does support discontinuous riparian corridor vegetation in the project area. A Section 404 permit (USACE Reference Number 26339S) and Streambed Alteration Agreement (CDFG Reference Number 1600-2003-5071-3) were initiated as part of the Phase 1 LECEF project for a planned upgrade of an existing storm water outfall into Coyote Creek.

The areas east of Coyote Creek and south of the project site are primarily urban and developed lands with landscaped habitats that tend to have limited value for sensitive wildlife species. Agricultural lands managed for row crops are found immediately on the east and west sides of the Coyote Creek levees. Former (fallow) agricultural lands are located between the LECEF site and Zanker Road to the west. The fallow areas are predominantly vegetated with ruderal plant species that tend to have a low value to all but the more common wildlife species.

As no direct impacts to serpentine habitats will occur from LECEF, this low-effect HCP addresses the indirect impacts that occur from nitrogen deposition on serpentine habitats that support federal threatened or endangered species, namely the Bay checkerspot butterfly and four plants: coyote ceanothus, Metcalf canyon jewel-flower, Santa Clara Valley dudleya and the Tiburon paintbrush. The nearest serpentine habitats are located nearly 10 miles southeast of the project site. A large area of potential effect from nitrogen compound emissions includes a portion of the hills located east of Highway 101 and south of San Jose that are collectively known as Coyote Ridge.

Coyote Ridge contains some of the last remaining serpentine habitat within Santa Clara County. This habitat type supports native plant species that are only found on serpentine rock-derived soils, including the four federally endangered plant species. Additionally, the area of potential effect supports larval host plants and nectar plants for the Bay checkerspot butterfly and is designated as part of the 18,293-acre critical habitat for the Bay checkerspot butterfly. The locations of serpentine habitat areas that support the four federally listed plant species, as well as the Bay checkerspot butterfly and its host and nectar plants, along with other biological resources in Santa Clara County, are shown in Figures 3 and 4. These serpentine habitat locations are based on the critical habitat units for Bay checkerspot butterfly (USFWS 2001).

3.3 Biological Resources of the LECEF Preserve

The existing LECEF preservation area, named the LECEF Ecological Preserve, in the Santa Clara Valley is part of a broader ecosystem that Coyote Ridge maintains as the last remaining sizable population of Bay checkerspot population of Bay checkerspot butterfly. The survival of the butterfly is very tenuous as has been shown by the recent extinction of the population on the Stanford University Jasper Ridge preserve (McGarrahan 1997). Coyote Ridge is one of the remaining undeveloped tracts of serpentine grassland in the Bay Area and has been designated by the USFWS as Critical Habitat for survival of the Bay checkerspot butterfly.

Figure 3. Regional Biological Resources

Figure 4. Special Status Species and Biological Resources, Preservation Site

Given the quality of serpentine habitats on Coyote Ridge, protection and conservation of this Critical Habitat for the Bay checkerspot butterfly may also serve to protect habitat for other special-status species that may occur there. Other species that could benefit from habitat conservation along the ridge, including the California red-legged frog, burrowing owl, Opler's long-horn moth, as well as serpentine endemic plants such as coyote ceanothus, Mt. Hamilton thistle, Santa Clara valley dudleya, Metcalf canyon jewel flower, and Tiburon paintbrush.

The preservation parcel has an intrinsic value as habitat in that it supports Bay checkerspot butterflies and host plants, Santa Clara Valley dudleya, and Metcalf Canyon jewel-flower (pers. comm. Dr. Stuart Weiss). In addition, the parcel is strategically located along the freeway frontage, which effectively blocks upslope access and development. Along with the preserve established for the Pico Power Plant project, it establishes an outpost of protected habitat further northwest on Coyote Ridge than other formally protected areas on Coyote Ridge.

3.3.1 Climate

The temperate climate of the project area is influenced by the regional topography and its proximity to the Pacific Ocean. Rainfall and temperature in this area show a bimodal seasonal pattern. Summers are warm and dry, except when marine inversion layers cause lasting morning overcast. Winters are wet and cool, with almost all the rainfall occurring between October and March and averaging between 16 and 25 inches per year.

The Mediterranean climate exerts a direct influence on the serpentine grassland ecosystem. Summer dormancy is a predominant biological response for most of the species inhabiting these serpentine ecosystems. This response is seen in plants in the form of seed set and the desiccation of annual plants and the summer dormancy of perennial plants. It is also shown in wildlife organisms associated with serpentine habitats as evidenced by the diapause stage of the Bay checkerspot butterfly larvae. Because of these seasonal drying patterns, disturbances such as those caused by excessive grazing create a potential management concern in drought years. The high degree of interannual variation in temperature and rainfall can affect survivorship and population trends over the long term.

3.3.2 Geology and Soils

The soils of the LECEF preservation area are mapped primarily as Montara rocky clay loam (MwF2) on the upper hill slopes with smaller areas of Altamount clay (AcF) and San Benito clay loam (SbF3) on the lower slopes near the western side of the site. The Montara soil mapping unit has 15 to 50 percent slopes with and rock outcrops covering 5 to 10 percent of the surface. These somewhat excessively drained soils are very shallow (10 to 16 inches) to a greenish gray serpentine bedrock. They are dark gray and very dark gray in color with moderately alkaline soil pH. Land uses on Montara soils are mainly range, wildlife, recreation, and watershed uses. The Altamount clay soil mapping unit has 30 to 50 percent slopes with well-drained soils that are moderately deep over bedrock. They are dark grayish-brown and grayish-brown in color with neutral and moderately alkaline soil pH. Altamount soils are typically associated with dry land grain, hay, pasture, and range uses. The San Benito clay loam soil mapping unit has 30 to 50 percent slopes with well drained soils that are shallow (20 to 48 inches) over bedrock. They are dark-grayish brown and

yellowish brown soils grading from neutral to moderately alkaline with depth. San Benito soils are typically associated with range and watershed uses (USDA 1974). Although erosion hazard associated with these soil mapping units is moderate to very high, signs of accelerated erosion have not been observed at the site.

The parent material that underlies the LECEF Ecological Preserve is derived from the ultramafic rock, serpentinite, whose primary mineral constituents consist of olivine, chrysotile (or asbestos), lizardite, and antigorite. Serpentine soils weathered from serpentinite have a unique soil chemistry and overall infertility that is the dominant factor that appears to limit plant growth and selection. Alkalinity and nutrient toxicity are additional chemical factors that play smaller roles in limiting plant growth in these soils (Kruckeberg 1984).

Serpentine soils have the following chemical characteristics: 1) levels of exchangeable magnesium that are much higher concentration than any other basic (i.e., positively charged) cation; 2) calcium levels that are usually lower than those found on non-serpentine soils; 3) levels of macronutrients (nitrogen, potassium, and phosphorous) and micronutrients (such as molybdenum) that are usually lower than those required for normal growth of crop plants; and 4) high concentrations of heavy metals (such as chromium and nickel). Serpentine soils in California range from slightly acidic to moderately alkaline, with the soils in the Santa Clara county reported to have a pH of 7.2 (Kruckeberg 1984).

In reality, it is the ensemble of chemical, physical, and biotic factors, rather than a single factor such as nitrogen, that forms the feedback loop that orchestrates the "serpentine syndrome" (Jenny 1980, cited in Kruckeberg 1984). The "serpentine syndrome" terminology has been used to describe the unique assemblages of plant and animal species that have evolved on serpentine habitats due to the complex interactions among factors related to climate, geology, soils, other organisms, and disturbance. It has been reported that these serpentine habitat communities may actually be *de facto* 'serpentine endemics' that have resulted from the competitive advantage of non-native grassland plants on non-serpentine soils and on the ability of the native plants (and associated herbivorous insects) to survive in the comparatively harsh serpentine environments (Launer and Murphy 1994).

3.3.3 Vegetation

The LECEF Ecological Preserve is dominated by serpentine grassland, a diverse ecosystem with a relatively high percent cover of introduced species. Species at the site are expected to include native grasses and forbs, serpentine endemic and near endemic species, non-native European grasses, and upland ruderal species (Table 1).

An initial assessment of the Ecological Preserve was conducted by Dr. Stuart Weiss in January and February, 2002 to evaluate the suitability for Bay checkerspot butterfly and its host plants. The assessment indicated all major nectar sources are likely present; however, additional surveys would be necessary during the flowering season to document occurrences. Initial vegetation monitoring transects were established on the LECEF Ecological Preserve by Dr. Weiss in April 2005 and an inventory of the on-site vegetation was started at that time.

Because the results of initial floristic survey are ongoing, the following information is derived from the LECEF Ecological Preserve initial site survey and from more detailed

information associated with nearby or adjacent parcels (SVP 2004). Detailed vegetation information will be developed as part of the monitoring and reporting requirements identified in this HCP.

The LECEF Ecological Preserve represents valuable habitat for the Bay checkerspot butterfly and the butterfly was confirmed to be present during the February 2002 ground survey by Dr. Weiss. The host plant, dwarf plantain (*Plantago erecta*), is found in numerous intermittent patches across the site but most commonly on north-facing slopes, along infrequently used roadbeds, and on thin soils on other slopes. Potential nectar sources such as owl's clover (*Castilleja* spp.), wild parsley, California goldfields, tidy-tips, and common muilla are expected to be abundant based on their occurrence on nearby parcels. European grasses such as Italian ryegrass (*Lolium multiflorum*) were observed on the site, while other species, such as slender wild oats (*Avena barbata*) and soft brome (*Bromus hordaceus*) could be expected to occur in the deeper soils. Ruderal species such as yellow starthistle (*Centaurea solstitialis*), black mustard (*Brassica nigra*), and filaree (*Erodium cicutarium*), are expected to be mostly restricted to disturbed sites such as road shoulders.

During the initial site monitoring visits in April 2005, the presence of federally endangered Santa Clara Valley dudleya (*Dudleya setchellii*) was confirmed on the site. Although one type of jewel-flower (*Streptanthus albidus* ssp. *peramoenus*) [a Federal Species of Concern] was observed, the federally listed Metcalf Canyon jewel-flower (*Streptanthus albidus* ssp. *albidus*) was not observed on the site. Other plants listed in this HCP, such as coyote ceanothus (*Ceanothus ferrisae*) and the Tiburon paintbrush (*Castilleja affinis* ssp. *neglecta*), are not believed to occur on the site.

TABLE 1
Plant Species Observed During Surveys of Parcels Near the LECEF Ecological Preserve

Family	Species	Common name	N/I*
Apiaceae	*Lomatium* spp.	Parsley	
Asteraceae	*Achillea millefolium*	Yarrow	N
	Aster sp.	Aster	
	Baccharis pilularis	Coyote brush	N
	Centaurea solstitialis	Yellow starthistle	I
	Cirsium fontinale var. *campylon*	Mt. Hamilton thistle	N
	Lasthenia californica	California goldfields	N
	Layia glandulosa	White tidy tips	N
	Layia platyglossa	Yellow tidy tips	N
	Stephanomeria virgata ssp. *plerocarpa*	Tall stephanomeria	
Boraginaceae	*Amsinckia intermedia*	Intermediate fiddleneck	
Brassicaceae	*Brassica nigra*	Black mustard	I
Ericaceae	*Arctostaphylos*	Sage	
Fabaceae	*Lupinus sp.*	Lupine	

TABLE 1
Plant Species Observed During Surveys of Parcels Near the LECEF Ecological Preserve

Family	Species	Common name	N/I*
	Trifolium sp.	Clover	
Geraniaceae	*Erodium cicutarium*	Filaree	I
	Geranium dissectum	Geranium	I
Juncaceae			
Liliaceae	*Allium falcifolium, lacunosum*	Wild onion	N
	Muilla maritima	Muilla	
Malvaceae	*Malva*	Bull mallow	I
Papaveraceae	*Eschscholzia californica*	California poppy	N
Plantaginaceae	*Plantago coronopus*	Buck's horn plantain	I
	Plantago erecta	Dwarf plantain	N
Poaceae	*Aira caryophyllea*	European hairgrass	I
	Avena barbata	Slender wild oat	I
	Bromus madritensis ssp. *rubens*	Foxtail brome	I
	Bromus hordaceaceus	Soft chess	I
	Elymus sp.	Wild-rye	
	Festuca elmeri	Elmer's fescue	N
	Hordeum murinum ssp. *leporium*	Mouse barley	I
	Hordeum brachyantherum ssp. *californicum*	California barley	N
	Lolium multiflorum	Italian ryegrass	I
	Nasella pulchra	Purple needlegrass	N
	Vulpia microstachys	Three-week fescue	N
Polemoniaceae	*Linanthus adrosaceus*	False babystars	N
Polyganaceae	*Eriogonum nudum* var. *nudum*	Naked-stemmed eriogonum	N
	Eriogonum sp. 2		
Primulaceae	*Anagallis arvensis*	Scarlet pimpernell	I
Schrophulariaceae	*Castilleja densiflora*	Common owl's clover	N
	Castilleja exserta	Purple owl's clover	N

*N/I = Native/Introduced
Source: SVP 2004

3.3.4 Wildlife

The habitat of the LECEF Ecological Preserve is well suited for mule deer (*Odocoileus hemionus*) and coyote (*Canis latrans*), and the activity of both of these species has been noted in the Coyote Ridge area. Other special-status species include the San Joaquin kit fox (*Vulpes macrotis mutica*) whose historic range (pre-1975) has been shown to extend into this area, as documented by the California Natural Diversity Data Base (CNDDB) (CDFG 2004). Common small mammal species in the area include voles (*Microtus*, *Clethrionomys*, sp.), field mice (*Peromyscus* sp.), California ground squirrels (*Spermophilus beecheji*), and black-tailed jackrabbit (*Lepus californicus*), which provide forage prey for raptor bird species.

Bird species observed in the area include the common raven (*Corvus corax*), gulls (*Larus* sp.), mallard (*Anas platyrhynchos*), northern harrier (*Circus cyaneus*), mourning dove (*Zenaida macroura*), black phoebe (*Sayornis nigricans*) and an unidentified flycatcher. Bird species observed in the adjacent golf course less than a mile away included a red-tailed hawk (*Buteo jamaicensis*), golden eagle (*Aquila chrysaetos*), killdeer (*Charadrius vociferus*), pied-billed grebe (*Podilymbus podiceps*), greater white-fronted goose (*Anser albifrons*), great egret (*Ardea alba*), European starling (*Sturnus vulgaris*), Brewer's blackbird (*Euphagus cyanocephalus*), and brown-headed cowbird (*Molothrus ater*). Burrowing owls (*Athene cunicularia*) have the potential to occur in the preservation area. While the presence of burrowing owls was not indicated in initial assessments of this parcel (Weiss 2002) they have been observed on Coyote Ridge and more complete surveys for this species will be completed as part of the planned monitoring program.

A wetland mitigation area to provide habitat for the California red-legged frogs (*Rana aurora draytonii*) is indicated on the map showing the wetland mitigation area associated with the Kirby Canyon landfill (see Figure A-1 in Appendix A).

3.4 Special-Status Species in the Project Area

The serpentine habitat in the Santa Clara Valley region is home to several special-status species. Special-status plant species, such as the Mt. Hamilton thistle (*Cirsium fontinale* var. *campylon*), Fragrant frittilary (*Frittilaria liliacea*) and the Metcalf Canyon jewel-flower (*Streptanthus albidus* ssp. *albidus*), have the potential to occur but were not observed during initial surveys in the preservation area (Table 2). Additionally, Santa Clara Valley dudleya (*Dudleya setchellii*) and the Bay checkerspot butterfly are known to occur along Coyote Ridge and have also been detected in the area of the LECEF Ecological Preserve. Discussions of the biology, habitat requirements, and threats to the Bay checkerspot butterfly and four federally listed plant species are included in Section 3.5.

TABLE 2
Special Status Plant Species Occurring in Coyote Ridge

Scientific Name	Common Name	Federal/ State/ CNPS[a]	Occurs in Preservation Parcel?[b]	Comments[c]
Castilleja affinis ssp. *neglecta*	Tiburon Indian paintbrush	E/T/1B	Unlikely	Perennial herbaceous flower growing to 60 cm tall, blooms Apr-Jun. Found in rocky serpentine areas of valley and foothill grasslands at elevations between 75 and 400 m. Threats include cattle grazing, gravel mining, and development. Known populations in the southern portion of Coyote Ridge (Figure 4).
Ceanothus ferrisae	Coyote ceanothus	E/T/1B	No	Evergreen shrub growing to 2 m tall, blooms Jan-May. Found on dry slopes of chaparral and valley and foothill grasslands associated with serpentine soils at elevations less than 300 m. Threatened by cattle grazing, dumping, fire management, and development, including expansion of Anderson Reservoir Spillway. Known populations in the southern portion of Coyote Ridge (Figure 4).
Cirsium fontinale var. *campylon*	Mt. Hamilton thistle	--/--/1B	Yes	Herbaceous perennial herb 60 to 200 cm, blooms Feb-Oct. Found in serpentine seeps in chaparral, cismontane woodland, and valley/foothill grassland at elevations between 100 and 890 m. Threatened by urbanization, trampling, and grazing. Commonly occurs in drainages on Coyote Ridge.
Dudleya setchellii	Santa Clara Valley dudleya	E/--/1B	Yes	Perennial herbaceous flower with fleshy leaves and peduncle growing 5 to 20 cm, blooms Apr-Jun. Found in serpentine outcrops of valley and foothill grasslands and cismontane woodlands at elevations between 120 and 300 m. Threatened by urbanization/development, cattle grazing, and off-road vehicles. Observed in several areas of Coyote Ridge and 191 plants observed on the preservation parcel in 2005.
Fritillaria liliacea	Fragrant fritillary	--/--/1B	Likely	Bulbiferous perennial herb, blooms Feb-Apr. Often found in serpentine soils in cismontane woodland, coastal prairie, coastal scrub and valley/foothill grassland at elevations between 3 and 410 m. Threatened by grazing, agriculture, urbanization, and non-native plants.
Lessingia micradenia var. *glabrata*	Smooth lessingia	--/--/1B	Likely	Erect annual herb 5 to 60 cm, blooms Jul-Nov. Found in serpentine soils in chaparral and cismontane woodland, often in roadcuts. Occurs at elevations between 120 and 420 m.
Malacothamnus hallii	Hall's bush mallow	--/--/1B	Likely	Evergreen shrub, blooms May-Sep. Found in chaparral and coastal scrub at elevations between 10 and 760 m. Often found on serpentine soils.

TABLE 2
Special Status Plant Species Occurring in Coyote Ridge

Scientific Name	Common Name	Federal/ State/ CNPS[a]	Occurs in Preservation Parcel?[b]	Comments[c]
Streptanthus albidus ssp. *albidus*	Metcalf Canyon jewel-flower	E/--/1B	Yes	Annual herbaceous flower growing 50 to 120 cm tall, blooms Apr-Jul. Found in valley and foothill grasslands in open areas with serpentine soils at elevations between 150 and 800 m. Threatened by development and off-road vehicles. Streptanthus species occurs on the preservation parcel, species to be identified during detailed botanical surveys.
Streptanthus albidus ssp. *peramoenus*	Most beautiful jewel-flower	--/--/1B	Yes	Annual herb 20 to 80 cm, blooms Apr-Jun. Found in serpentine soils in chaparral, cismontane woodland and valley/foothill grassland at elevations between 120 and 1,000 m. Threatened by development and grazing. Streptanthus species occurs on the preservation parcel, species to be identified during detailed botanical surveys.

[a] Status Categories:

State status determined from *Special Plants List* (June 1999), and/or *State and Federally Listed Endangered, Threatened, and Rare Plants of California* (April 2002), prepared by CDFG Natural Diversity DataBase. CNPS status determined from *CNPS Inventory of Rare and Endangered Vascular Plants of California* (Tibor 2001). Codes used in table are as follows:

E = Endangered; T = Threatened; R = California Rare; PE = Proposed Endangered; C = Candidate:

Taxa for which the USFWS has sufficient biological formation to support a proposal to list as endangered or threatened,

SSC = CDFG "Species of Special Concern.," CNPS List: 1A = Presumed Extinct in CA; 1B = Rare or Endangered in CA and elsewhere; 2 = R/E in CA and more common elsewhere; 3 = Need more information; 4 = Plants of limited distribution. -- = Species not state-listed.

[b] Source: CNDDB/RareFind, September 2003.

[c] Source: Hickman 1993; Tibor 2001

3.5 The Bay Checkerspot Butterfly and Federally Listed Serpentine Endemic Plants

3.5 1 Bay Checkerspot Butterfly

The Bay checkerspot butterfly (*Euphydryas editha bayensis*) is a medium-sized butterfly with a wingspan of about 2 inches (5 cm). The forewings have black bands along the veins on the upper wing surface, which contrast sharply with bright red, yellow, and white spots. It is a federally listed threatened species that is known to occur on remnant patches of serpentine grassland in the San Francisco Bay Area. The Bay checkerspot butterfly's primary habitat consists of native grasslands on large serpentine outcrops. Secondary or "satellite" habitat islands of smaller serpentine outcrops may also develop robust butterfly colonies when favorable climate conditions promote good habitat growing conditions. Tertiary habitat areas may be found where larval food plants occur on non-serpentine soils, but the populations are not dense or persistent. Serpentine grasslands remain the preferred habitat for the butterfly because the dry, nutrient-poor, and sometimes toxic conditions found in serpentinized areas have impeded an extensive invasion of weedy species that has converted nearly all native perennial grasslands to non-native annual grassland. The harsh nature of the soil and ongoing grazing (habitat management) of some of these areas have

allowed for the persistence of native plants, including the host plants for the Bay checkerspot butterfly (*Plantago erecta*, *Castilleja densiflora*, and *Castilleja exserta*), in these areas (Huenneke et al. 1990; Launer and Murphy 1994).

The Bay checkerspot butterfly currently persists as a meta-population (i.e., a group of spatially distinct populations that can occasionally exchange dispersing individuals). The populations in a meta-population have interdependent extinction and colonization processes, meaning that individual populations may go extinct and later be recolonized from another nearby surviving population, but otherwise exist in relative isolation (Ehrlich 1961; Ehrlich and Murphy 1987; USFWS 1998). For local sub-population (or demographic groups) extinction and recolonization events are a natural part of regional meta-population dynamics. However, the Bay checkerspot butterfly populations have been going extinct at an increased rate in recent years as precipitation variability has increased in Central California. The cause for the recently observed extinctions is not clear, but it does appear that habitat degradation and fragmentation have limited the ability of the butterfly populations to cope with the results of increased climatic variability on host and nectar plants (Ehrlich et al. 1980; McLaughlin et al. 2002). Habitat degradation has been attributed to native plant displacement by introduced European annual grasses (Holmes and Rice 1996; Weiss 1999). Increased development pressures near urban areas have resulted in fragmentation and encroachment on the remaining serpentine habitats.

The life history and population biology of the Bay checkerspot butterfly has been well-studied since the early 1960s (Launer and Murphy 1994; McLaughlin et al. 2002). The larvae are dependent on the host plant, dwarf plantain, with owl's clovers providing secondary larval forage. Adult nectar plants include desert parsley (*Lomatium* spp.), California goldfields (*Lasthenia californica*), tidy tips (*Layia platyglossa*), scytheleaf onion (*Allium falcifolium*), sea muilla (*Muilla maritima*), false babystars (*Linanthus androsaceus*), intermediate fiddleneck (*Amsinckia intermedia*), and other plant species (USFWS 1998). These plants are most commonly found on serpentine bunchgrass and are less common in valley and foothill non-native grasslands.

The Bay checkerspot butterfly must grow large enough to enter diapause before the plants senesce (mature and dry up) in the late spring to early summer. Weather conditions exert direct effects on both the butterfly larvae and the host plants (Hobbs and Mooney 1991; Ehrlich et al. 1980). The key factor in year-to-year population density changes is associated with fewer larvae reaching diapause due to starvation in extremely dry years (Ehrlich et al. 1980; Ehrlich and Murphy 1987). While population levels may subsequently increase during more favorable years, increased risks of Bay checkerspot butterfly population extinctions have been associated with increased climatic variability and prolonged extreme weather events (Ehrlich et al. 1980; Ehrlich and Murphy 1987; McLaughlin et al. 2002) such as the California drought of the mid-1970s or the El Niño weather of 1982-1983 and 1997-1998. Smaller, fragmented habitats with low degrees of topographic diversity make it particularly difficult for local butterfly populations to adapt to climatic variability.

Noting that rainfall in the Bay Area had become increasingly variable, especially after 1971, McLaughlin et al. (2002) developed Bay checkerspot butterfly population models based on observed correlations between rainfall data and population fluctuations. The authors argue that the amplitude of population fluctuations has increased since 1971 and that this has caused a decrease in the persistence rates for local butterfly populations. Using the example

of two sub-populations at Jasper Ridge, the average time to population extinction decreased from around 444 years and 163 years under pre-1971 rainfall patterns to 19 years and 52 years under post-1971 rainfall patterns. Results of this model contradict alternative hypotheses that had been proposed to explain the extinctions, including host plant declines (butterfly abundance was poorly correlated with larval host plant cover), natural predators, and research impacts (McLaughlin et. al. 2002). While it was noted that the Bay checkerspot butterfly had probably persisted through previous periods of more severe climatic variability, their ability to cope with climatic changes was likely due to greater habitat continuity and extent in the past. Because current populations persist as isolated remnants in a highly urbanized environment, they may face inevitable stochastic extinction.

As previously noted, there is no suitable habitat for the Bay checkerspot butterfly at the LECEF project site; however, serpentine grassland and Bay checkerspot butterflies are known to occur on the LECEF Ecological Preserve, which is located within the Metcalf Critical Habitat unit for the butterfly. This preservation site is also located in the Bay Area air shed that may be potentially affected by nitrogen deposition from the proposed power plant in addition to other existing NOx sources in the area. Adaptive management of the Preserve is an essential part of maintaining the habitat for the butterfly, which will include cattle grazing at levels sufficient to control the non-native grasses yet not eliminate listed plant species that may occur on the site.

3.5.2 Federally Listed Serpentine Endemic Plants

Four plant species that occur almost exclusively on serpentine soils have also been listed by the USFWS. These species are the federally endangered coyote ceanothus (*Ceanothus ferrisae*), Metcalf Canyon jewel-flower (*Streptanthus albidus* ssp. *albidus*), Santa Clara Valley dudleya (*Dudleya setchellii*), and the Tiburon paintbrush (*Castilleja affinis* ssp. *neglecta*).

There is no suitable habitat for the above-listed plants at the LECEF project site. Suitable habitat for some of these plants exists at the LECEF Ecological Preserve, and the Santa Clara Valley dudleya was observed in rocky outcrops. A Streptanthus species (*Streptanthus albidus* ssp. *peramoenus*) a Federal Species of Concern, occurs on the Ecological Preserve parcel; however, the Federal endangered Metcalf Canyon jewel-flower was not observed during the initial botanical surveys in April 2005. Planned surveys for these plants and ongoing monitoring have been proposed to determine where the LECEF Ecological Preserve supports listed plants. Coyote ceanothus and Tiburon paintbrush are not expected to occur on the Ecological Preserve parcel (pers. comm. Weiss 2004), although suitable habitat and known populations occur on the southern portion of Coyote Ridge (USFWS 1998, Figure 4). Appropriate management steps have been developed by preserve managers and the Land Trust for Santa Clara County in cooperation with USFWS for similar preserves on Coyote Ridge and Tulare Hill (Metcalf Energy Center Ecological Preserve) to manage the serpentine grassland habitat for the listed plants and Bay checkerspot butterfly. Furthermore, Coyote Ridge and the ecological preserve can provide future sites where establishment of the listed species may be attempted.

Coyote ceanothus is an erect evergreen shrub of the buckthorn family (*Rhamnaceae*) that grows 1 to 2 meters high (3 to 6 feet) with long, stiff, divergent branches. It has round leaves that are dark green and hairless on the upper surface and light green with minute hairs on the lower surface (USFWS 1998). The leaf margins of coyote ceanothus have short teeth or

no teeth and the base of the leaf tapers abruptly or is rounded. The plant has small white flowers that are borne in clusters. The fruit of coyote ceanothus is distinguished by three conspicuous horns that protrude from the tip of the fruit (Hickman 1993).

Coyote ceanothus is found on dry slopes of serpentine-based soils along hillsides in chaparral and in valley and foothill grasslands below 300 meters (approximately 1,000 feet) (Hickman 1993, USFWS 1998). Currently, coyote ceanothus is known from only three populations that occur in Santa Clara County: 1) Anderson Dam, 2) Kirby Canyon, and 3) Llagas Avenue, north of Morgan Hill (USFWS 1998). The Anderson Dam population is believed to be the largest population, with near 5,000 plants. Reports of other occurrences of this species in San Mateo and Santa Cruz Counties were subsequently found to be erroneous (USFWS 1998).

Coyote ceanothus is threatened by development, unauthorized dumping, landfill activities, cattle grazing, and stochastic events (involving random or chance events). Land disturbances, in general, can promote erosion and invasion of weedy, competitive species that may cause declines of coyote ceanothus (USFWS 1998).

Metcalf Canyon jewel-flower is an annual herb of the mustard family (Brassicaceae) that grows up to 1 meter (3 feet) in height. This plant has pale green, glaucous stems and leaves and has bristly hairs at the base of the stem. The basal leaves are narrowly oblanceolate and coarsely toothed while the upper stem leaves are linear to lanceolate with entire margins. The flowers of the Metcalf Canyon jewel-flower are borne on leafless terminal racemes (unbranched flower stalks that produce flowers that open from bottom to top). The flowers consist of four sepals that are white to yellow to whitish-green with the three top sepals being fused and the bottom sepal being free and spreading. The petals of the jewel-flower are whitish with light purple veins. *Streptanthus albidus* ssp. *albidus* is distinguishable from *Streptanthus albidus* ssp. *peramoenus* in that the latter subspecies has lavender to rose-purple colored sepals and purplish colored petals (Hickman 1993).

Metcalf Canyon jewel-flower occurs in serpentine outcroppings with little or thin soils within serpentine grasslands at elevations of 150-800 meters (495 to 2,640 feet) (Hickman 1993). Rare plant species associated with Metcalf Canyon jewel-flower include most beautiful jewel-flower (*S. albidus* ssp. *peramoenus*), Mt. Hamilton thistle (*Cirsium fontinale* var. *campylon*) and Santa Clara Valley dudleya (*Dudleya setchellii*).

The Metcalf Canyon jewel-flower is known only to occur within a range of approximately 20 miles between San Jose and Anderson Reservoir. A Streptanthus species was observed on the LECEF Ecological Preserve during the initial habitat assessment and identification to species will be determined during detailed botanical surveys of the site (Weiss 2002). Furthermore, the serpentine outcroppings where this species occurs are patchily distributed within the entire range of the species. The Metcalf Canyon jewel-flower has a very limited distribution within a portion of Santa Clara County that is increasingly under development pressures from San Jose and Morgan Hill, and is the most significant reason for its decline. Other less significant pressures that could threaten the survival of Metcalf Canyon jewel-flower include overgrazing, unauthorized dumping and recreational off-road activities (USFWS 1998).

Santa Clara Valley dudleya is a low-growing perennial plant of the stonecrop family (*Crassulaceae*). The Santa Clara Valley dudleya has fleshy, triangular to oblong, glaucous leaves. Flowers are attached to two or three flowering stems that may branch 1 time and reach a height of 5 to 20 centimeters (2 to 8 inches). The flowers are a pale yellow color and have five petals that emerge from May to June (Hickman 1993; USFWS 1998). Very little is known about the reproductive biology or demography of this species.

Santa Clara Valley dudleya is found in serpentine grasslands from 120-300 meters (390 to 990 feet) in elevation. Additionally, this species is further restricted to the immediate vicinity of rocky outcrops of serpentine material. Santa Clara Valley dudleya extend roots into crevices of rocky outcrops and are only found around outcrops with crevices of sufficient depth (15 centimeters/6 inches) (USFWS 1998). For these reasons, it is not surprising that Santa Clara Valley dudleya is limited geographically to areas of serpentine outcrops from the area of San Jose to San Martin (USFWS 1998).

Santa Clara Valley dudleya is restricted to the Coyote Valley portion of Santa Clara County. It was observed on the LECEF Ecological Preserve during the initial site assessment in 2002 (pers. comm. Weiss 2004) and again during the initial monitoring in April 2005. As such, the primary threat to survival of this species is urban development. Other potential threats on Coyote Ridge come from landfill activities, unauthorized dumping, quarry expansion, and recreational off-road vehicles. Overgrazing and plant collection may also cause significant adverse effects on limited populations (USFWS 1998). It has been reported that cattle tend to browse on this plant, leaving it less vigorous than plants outside grazed areas (Weiss 1999).

Tiburon paintbrush is a semi-woody perennial plant that grows from 30-60 centimeters (1 to 2 feet) in height and belongs to the snapdragon family (*Scrophulariaceae*). Tiburon paintbrush has erect, branched stems that are covered in soft hairs. The leaves of the Tiburon paintbrush are lanceolate and possess from zero to 5 lobes. Flowers of this plant are yellowish to red in color and floral bracts (a small leaf- or scale-like structure generally subtending a branch, peduncle, pedicel, or flower) are conspicuous and yellowish, sometimes with red-tips (Hickman 1993; USFWS 1998). The simple (unbranched) hairs and lack of glands below the flower clusters (inflorescences) distinguish this species from other species of *Castilleja* on the Tiburon peninsula.

Tiburon paintbrush occurs in serpentine bunchgrass communities on slopes between 75 and 400 meters (250 and 1,300 feet) elevation. In Santa Clara County, Tiburon paintbrush occurs in close proximity to Santa Clara Valley dudleya (USFWS 1998). Tiburon paintbrush is known from seven populations. Five of these occur in Marin County (three of which are on the Tiburon Peninsula), one occurs in the American Canyon (Napa County), and one occurs in the vicinity of Anderson Reservoir in Santa Clara County. The Tiburon paintbrush population in Santa Clara County (13 plants) occurs almost exclusively on private land that may be subject to grazing pressures (USFWS 1998). None were observed on the LECEF Ecological Preserve (pers. comm. Weiss 2004).

SECTION 4

Impacts/Take Assessment

This section describes the potential impacts to the Bay checkerspot butterfly and four federally listed plants due to operation of the LECEF.

4.1 Impacts Assessment

4.1.1 Direct Impacts

Direct impacts to Bay checkerspot butterfly and the four federally listed plants will not occur from construction or operation of the LECEF. The LECEF project site is located within an active and fallow agricultural area of the City of San Jose that is surrounded by commercial, urbanized or otherwise developed areas. No serpentine habitat for Bay checkerspot butterfly and the four federally listed plants occurs within the project area. No sensitive biological communities occur in the immediate project area and potential habitat for special-status species was previously discussed in Section 3.1. Based on the site location, mitigation, preservation, and avoidance measures proposed for LECEF construction and operations, direct impacts to listed species will not occur.

4.1.2 Indirect Impacts

The USFWS, with concurrence from the CEC staff, has determined that nitrogen emissions from cars, power plants and other industrial sources have caused degraded conditions in serpentine grassland ecosystems, which may adversely affect the Bay checkerspot butterfly, as well as the four federally listed plants. Increased NOx emissions from cars and other industrial sources, which enrich (much like a plant fertilizer) the nutrient-poor serpentine soils, has been cited as the primary factor that enhances competition by non-native grasses.

Single chemical constituents, nutrient or deficient, have often been cited to account for the unique soil conditions and vegetation found on soils weathered from the blue-green serpentine rock. However, as previously noted, the entire suite of chemical, physical and biotic properties of serpentine soils must be considered as a complex of interacting factors that result in the "serpentine syndrome" (Kruckeberg 1984). Properties of serpentine soils include: 1) high levels of minerals such as aluminum, nickel, chromium, and magnesium, 2) low levels of essential nutrients such as nitrogen, phosphorous and potassium 3) sparse plant cover, and 4) high heat and moisture stress. A suite of serpentine endemic species has evolved that can tolerate these adverse conditions, often restricted to serpentine soils because they are out-competed in other environments. Nitrogen deposition, therefore, has been seen as a contributing factor to explain the observed invasion of serpentine environments by non-native grasses (Weiss 1999).

The primary line of evidence to support the nitrogen deposition theory stems from fertilization studies that demonstrate changes in species composition following additions of nitrogen fertilizer at a rate of 100 kg N/ha/yr (Huenneke et al. 1990). This is up to 10 times the rate of nitrogen deposition in the San Jose area, which has been estimated between

10 and 15 kg N/ha/yr (Weiss 1999). Levels of nitrogen deposition as low as 5 kg N/ha/yr have been associated with changes in competitive relations between plant species (Heil et al. 1988) and specifically, with increasing non-native grass occurrences on serpentine soils (Weiss 1999).

It should be noted that there is evidence that may indicate that nitrogen deposition may not be solely responsible for the invasion of non-native grasses in serpentine habitats. Since the early 1980s, an Emissions Reduction Credit system has been in place in the San Francisco Bay Area, and NOx emissions in the Bay Area have generally decreased since that time (although ammonia emissions have increased, due to the use of catalytic converters to control NOx). In the Coyote Ridge area, invasions by non-native annual grasses in serpentine habitats have been associated with periods of high rainfall, which would tend to favor invasive species (Milchunas and Laurenroth 1995; Hobbs and Mooney 1991).

Based on their analysis and review of several other power plant AFCs, the USFWS and CEC have concluded that although nitrogen deposition from power plant emissions may have minor effects on the soils that support host and nectar plants for butterflies and other serpentine endemic plant species (including the four federally listed plants), the cause-and-effect relationship that would show that indirect impacts were occurring would be difficult to prove for several reasons (LECEF, LLC 2003). These difficulties include the distance between the power plant and the area of potential impacts, the essentially unmeasurable deposition rate of emissions from the power plant, the number of other larger nitrate sources in the intervening area, and the conservative nature of the air impact modeling (see discussion below in Section 4.2). As previously mentioned, LECEF has secured 29, 029 tons/year of NOx ERCs to offset potential nitrogen deposition impacts from the Phase 2 operations.

Because of the NOx ERCs and through adaptive management of the preserve habitat, it is anticipated that enactment of this HCP will help to offset cumulative impacts from all NOx sources in the air basin and help to achieve the goals of the Recovery Plan (USFWS 1998).

4.1.3 Cumulative Impacts

There will be no permanent loss of special-status species habitat as a result of operation of the LECEF. For this reason, the project would not cause direct significant cumulative impacts to special-status plant or wildlife habitats in the project area.

The CEC and USFWS have required power plants projects in the Santa Clara Valley to assess the effects of their projects on serpentine endemic species under cumulative effects circumstances. Power plant projects located in the Santa Clara Valley include the Metcalf Energy Center (MEC), Gilroy Energy Center (GEC), Pico Power Plant (PPP), and LECEF. Additionally, expansion of the U.S. Highway 101 along the western boundary of Coyote Ridge would provide access for additional vehicle traffic and corresponding nitrogen emissions.

While the agencies have determined that nitrogen deposition from power plants could not (individually) be shown to have indirect effects on serpentine endemic species, they concluded that air dispersion modeling (for each project) did show some level of nitrogen deposition above background conditions. When combined with the traffic estimates from the U.S. Highway 101 expansion, the other industrial sources including power plants in the

air shed, and background conditions, the agencies have concluded that emissions from the LECEF could have a cumulatively adverse effect on serpentine endemic species (LECEF, LLC 2003, 2004b). While the individual contribution of the LECEF emissions actually represent a very small fractional (much less than 1 percent) increase over the current background/ambient deposition rates, any increase in these emissions can contribute cumulatively to an acceleration in the current rate at which non-native plants are invading serpentine environments.

This HCP provides a set of preservation measures in Section 5.0 that are intended to satisfy the requirements for an incidental take permit under Section 10(a) of the Endangered Species Act for long-term operation of the LECEF (currently estimated to be 50 years).

4.2 Take Assessment

Regulatory agencies have determined that the cumulative impact of increases in nitrogen deposition from cars, power plants, and other industrial sources result in increased growth of non-native grasses. The adverse effect of this phenomenon is particularly acute in areas which are the last remaining fragment of habitats that are dominated by native plants, namely serpentine soil environments. Serpentine habitats are particularly at risk in areas where management of non-native annual grasses has been eliminated, such as grazing or burn prescriptions. Natural levels of nitrogen and other macronutrients in serpentine soils are typically very low (Kruckeberg 1984). It has been reported that the incremental increases in atmospheric nitrogen deposition on these soils have altered the competitive balance between the native/non-native plants (Weiss 1999) permitting the expansion of non-native grasses in these areas. This invasion of non-natives has the effect of reducing the available water, light, and nutrient resources for native plants on serpentine soils (including the host and nectar plants critical for the survival of the Bay checkerspot butterfly). As host and nectar plant populations decrease, the number of post-diapause larvae and adult butterflies also decrease, which would constitute "take" under the Endangered Species Act.

Based on the determination by the USFWS and CEC staffs that the LECEF NOx emissions could have potential cumulative effects on serpentine endemic species, an assessment of the level of "take" was conducted for Bay checkerspot butterfly. Given the nature of this indirect impact, it must be recognized that the nitrogen deposition can affect butterflies under the following conditions:

1. The deposition must occur on serpentine or similar soils.
2. The serpentine soils support host needed by the butterflies.
3. The host and nectar plants would be threatened with population decreases or decreased vigor due to increase in percent cover and biomass of non-native annual grasses.

Wide fluctuations in local Bay checkerspot butterfly populations are a normal part of the dynamic of the current meta-populations living on fragmented habitats (Ehrlich et al. 1980; McLaughlin et al 2002). Also, the LECEF project's contribution to the total nitrogen background deposition rate has been calculated as a fraction of one percent. For these reasons, it is nearly impossible to directly quantify the number of butterflies that would be affected per unit of nitrogen deposited. Instead, "take" is quantified as the acreage of potentially suitable butterfly habitat impacted by the LECEF. As described in Section 1.2,

Section 9 of the Act does not strictly prohibit incidental take of plant species; therefore, take assessments were not performed for those species.

The estimation of "take" for the LECEF project has been calculated as the ratio of the average deposition rate of the power plant to the background deposition rate multiplied by the total acres potentially impacted. In terms of the LECEF project, "take" was calculated by first identifying the total acres potentially impacted. In 2008, the USFWS re-designated 13 Critical Habitat Units for the Bay checkerspot butterfly (USFWS 2001). Only 9 of these 13 units occur in Santa Clara County and could reasonably be considered within the area potentially affected by emissions from the LECEF. In designating these critical habitat areas, the USFWS sought to protect not only the serpentine habitat upon which the butterfly depends for food, but dispersal areas that are not serpentine and "inclusions" of non-serpentine grassland and other habitats. These units also contain residential, industrial and paved areas that do not support butterflies. It should be noted that increases in nitrogen deposition, from whatever sources, in the non-serpentine inclusions, do not impact the Bay checkerspot butterfly and listed serpentine endemic plants. Therefore, although the total area designated as critical habitat by the USFWS in the area that could be potentially affected by emissions from the LECEF is over 18,000 acres, only a portion of this is actually serpentine habitat and therefore sensitive to nitrogen deposition. According to the Santa Clara Valley Habitat Conservation Plan second administrative draft (JSA 2009) and Dr. Stuart Weiss, the actual area of serpentine habitat within Santa Clara County has been calculated at approximately 10,306 acres, which corresponds to the amount of serpentine habitat in the potential impact area of LECEF emissions.

To determine the potential effect of the LECEF emissions and therefore some estimation of "take", it is necessary to estimate the background deposition rate in the local region (i.e., ambient nitrogen deposition without the LECEF) and the average deposition rate of emissions from the LECEF. The background deposition rate was calculated as 8.4 kg/ha-yr by Stuart Weiss and was agreed upon in meetings between USFWS, CEC, Dr. Weiss and several power plant proponents. There are, in addition, several deposition 'hot spots;' areas within which background deposition can go as high as 15-20 kg N/ha/yr.

The average deposition rate of emissions from the LECEF was calculated for all turbines under operation using the Industrial Source Complex Short Term model, (ISCST3) air dispersion model. ISCST3 is a steady-state, mass-conserving, non-reactive (i.e., no chemistry) Gaussian plume dispersion model (LECEF, LLC 2003, 2004b).

The ISCST3 model calculates atmospheric deposition of nitrogen by calculating the wet and dry fluxes of total nitrogen. This deposition is accomplished by using a resistance model for the dry deposition part and by assigning scavenging coefficients for the wet removal process from rainout. Depositional parameters are input into the model in order to estimate the deposition of nitrogen. Again, conservative modeling assumptions were used for depositional parameters, which were based on HNO_3, a compound that tends to deposit more readily than other nitrogen compounds. In the calculation of total nitrogen deposition from both NOx and NH_3, it was assumed that both pollutants were converted in stack into depositional nitrogen. Ammonia, after in-stack conversion into nitrogen, accounted for approximately 80 percent of the nitrogen mass. Thus, ammonia (NH3) accounts for approximately 80 percent of the total modeled deposition. Additional discussion of nitrogen deposition mechanisms and modeling inputs can be found in the Biological Resources

section of the LECEF AFC and in the subsequent Response to Data Requests (LECEF, LLC 2003, 2004b).

Table 3 shows the average deposition rate of emissions from the LECEF under Phase 2 with the project running in combined-cycle, based on the ISCST3 model.

TABLE 3
Estimated Potential Effects Acreage

Critical Habitat Unit	Unit Acres (USFWS 2008)	Acres of serpentine habitat (SCVHCP 2009)	Average deposition (kg/ha-yr)	Project deposition as a percent of background	Effects Ac 2009
Bear Ranch Unit	283	59.9	0.013676	0.0016281	0.0975232
Communication Hill	0	170.0	0.094108	0.01120333	1.9045661
Kalana Hills	226	106.4	0.0370204	0.00440719	0.468925
Kirby	5,446	2,753.9	0.0288884	0.0034391	9.4709375
Morgan Hill	507	361.9	0.0268547	0.00319699	1.1569907
Metcalf Unit	3,019	1,158.4	0.0372243	0.00443146	5.1334033
San Felipe	659	597.7	0.025912	0.00308476	1.8437302
Silver Creek	825	576.2	0.0575783	0.00685456	3.949666
San Vicente-Calero	1,543	520.0	0.0271736	0.00323495	1.682174
San Martin	467	201.4	0.0212239	0.00252665	0.5088673
Santa Theresa Hills	3,278	1,209.4	0.0409335	0.00487304	5.8934546
Tulare Hill	348	347.4	0.0478161	0.00569239	1.9774224
Total (acres)	**16,601**	**8,062.58**			34.08766
			0.4584092[2]		
FWS additions		2,243[1]	0.038201[3]	0.004548[4]	10.201164[5]
Total (acres)		**10,305.68**			**44.288824**

[1] Serpentine habitat in Santa Clara County outside the 2008 designated Critical Habitat (Based on discussions with Dr. Stuart Weiss).

[2] Sum of all of Column C.

[3] Average of Column C (sum divided by 12) and used for the avg. deposition of 2,243 ac of serpentine habitat outside critical habitat.

[4] Project deposition as a percent of background (Ave of Column C divided by 8.4 kg N/ha-yr).

[5] Effects acreage of the additional serpentine grassland ac.

* The 170 ac in column B2 for Communications Hill was left in the row (instead of adding to the 2,243 ac outside critical habitat) because ave. deposition was provided for that area.

The estimate of "take" is calculated by determining the ratio between the average deposition rate and the background deposition rate (average deposition rate divided by background [8.4 kg/ha-yr]). This ratio is then multiplied by the number of acres affected to establish the impacted acreage or "take". The acres affected is the estimated acreage of potentially suitable serpentine habitat in each of the 12 Critical Habitat units in Santa Clara county, whose total comes to 9,926 acres, as previously mentioned.

As shown in Table 3, the estimate of "take" of Bay checkerspot butterfly for the LECEF project, corresponds to approximately 40 acres of habitat. It should be noted again that this is a very conservative value based on a consistently conservative modeling process.

SECTION 5

Conservation Strategy

5.1 Biological Goals and Objectives

The biological goals for this HCP are as follows:

- To protect populations of Bay checkerspot butterfly and federally listed serpentine plants by establishing the LECEF Ecological Preserve
- To protect, manage, and maintain/improve the existing habitat for Bay checkerspot butterfly and federally listed serpentine plants at the LECEF Ecological Preserve.

To accomplish the first goal, this HCP proposes to formally designate an existing 40-acre property (i.e., the LECEF Ecological Preserve) as a permanent preservation area for Bay checkerspot butterfly and federally listed serpentine plants. LECEF has also established and funded an endowment for management of the preservation area in perpetuity. Furthermore, LECEF has secured 27,945 tons/year of NOx ERCs to offset potential nitrogen deposition impacts from the Phase 2 operations.

This goal will also be accomplished by monitoring the populations of Bay checkerspot butterflies and the federally listed serpentine plants, as they occur on the LECEF Ecological Preserve (see section 5.5 below). This information will be integrated with data from adjacent and nearby conservation areas to help make sound decisions for specific management of the LECEF Ecological Preserve and for the overall management of the designated Critical Habitat and other suitable areas for these listed species on Coyote Ridge.

To accomplish the second goal, management of the preservation area includes the monitoring for plant composition, non-native grass cover, invasive weed populations and cover, and butterfly host and nectar and serpentine endemic plant populations, cover, and vigor. Furthermore, preservation area managers will minimize the spread of invasive weeds and non-native annual grasses in locations where they may have negative effects on the host and nectar plants for butterflies and on the listed endemic plants. This objective is accomplished through a cattle grazing lease with closely controlled grazing on the 40-acre preservation area in perpetuity. The following targets will be met in 5 out of 10 years and compared to a Service approved reference site:

- Primary host plant (*Plantago erecta*): Minimum 5% cover across entire 40 ac site with at least 1 ac out of 10 acres with densities of 35% or more.
- Secondary host plants (both *Castilleja exserta and Castilleja densiflora* species combined): Minimum 0.5% cover across entire 40 ac site.
- Nectar Sources: Minimum 5% cover across entire 40 ac site with 1 ac out of 10 acres with densities of 30-50%.
- Annual Grass: Maximum 35% cover across entire 40 ac site.

- Thatch Cover: Maximum 20% cover across entire 40 ac site.

The above targets may be revised (increased or decreased) if monitoring determines that populations of the Bay checkerspot butterfly are not stable or increasing over baseline estimates over a 10 year average.

5.2 Preservation and Mitigation Measures

To offset the potential cumulative impacts to Bay checkerspot butterfly and federally listed serpentine plants from operation of the LECEF, the Applicant proposes the following measures:

- Migitation Measure 1 – Designation through the USFWS Section 10 process of a 40-acre parcel of serpentine habitat as a preservation area for the serpentine endemic species and management of this parcel in perpetuity to maintain suitable habitat conditions for these species. Management of this area will be funded through an endowment of $541,600.
- Mitigation Measure 2 – LECEF has purchased BAAQMD air pollution credits for NOx equivalent to 27,945 tons/year for Phase 2 operations. Purchase of these credits will help to reduce the effects of nitrogen deposition on serpentine plant species not found on the 40-acre preservation site (see Table 2 for a list of these species). These NOx ERCs will be surrendered to the BAAQMD prior to operation of LECEF Phase 2.

5.2.1 Preservation Area

The LECEF Ecological Preserve is located on Coyote Ridge in the Santa Clara Valley, approximately 4,500 feet northwest of the junction of Highway 101 and Coyote Creek Golf Drive. The preservation site is part of a larger property, owned by Castle & Cooke, Inc., which spans a portion of the Coyote Ridge from the Anderson Reservoir to Highway 101. The approximately 3,123 acre property, which contains habitat for the Bay checkerspot butterfly, the California red-legged frog, Santa Clara Valley dudleya, and Mt. Hamilton thistle, is being converted to preservation land (Refer to Figure A-1 in Appendix A).

The 40-acre parcel acquired by LECEF, LLC is located at the northern end of the Castle & Cooke property, adjacent to a 40-acre preservation parcel recently purchased established by Silicon Valley Power in conjunction with the Pico Power Plant project (Refer to Figure A-1 in Appendix A).

While the LECEF Ecological Preserve occurs within the San Jose city limits, it is outside of the urban growth boundary as defined in the City of San Jose General Plan (2004). A major component of the growth management strategy for the City of San Jose is the establishment of a "Greenline/Urban Growth Boundary" that is intended to develop clearer identity for the City by defining where the City begins and ends and to preserve valuable open space resources. The key open space elements that would be preserved by the Greenline/Urban Growth Boundary are the hillsides, the baylands and the rural/agricultural areas in the south Coyote Valley. The open space lands preserved under the Greenline/Urban Growth Boundary Strategy are intended to serve as environmental preserves for the protection of wildlife habitat, watersheds, and natural ecosystems. The most extensive and visually

prominent feature addressed as part of the Greenline/Urban Growth Boundary strategy are the hillsides that can also serve as rangelands for agriculture and grazing, in addition to the resource values noted above. Because of their role under the Greenline/Urban Growth Boundary Strategy, the hillsides (and, by association, the LECEF Ecological Preserve) are not planned for rural or urban development and are not located within the planned urban growth zone and are unlikely to be developed in the future.

The approach to preservation of habitat on Coyote Ridge has been considered as a model for protection of listed species (Murphy 1988). The LECEF Ecological Preserve is unlikely to be threatened by future development surrounding the site, as it is located within the larger Castle and Cooke property and is surrounded by other currently designated preservation lands or lands that are intended for future preservation. Accordingly, LECEF, LLC has transferred the LECEF Ecological Preserve to the Land Trust for Santa Clara County and has set up an endowment for them to manage the property in perpetuity (See Appendix C).

Initial surveys of the LECEF Ecological Preserve were conducted by Stuart Weiss on January 30, 2002 and on February 22, 2002 and are included in Appendix D. Suitable habitat for serpentine plants exists at the LECEF Ecological Preserve, and the Santa Clara Valley dudleya was observed in rocky outcrops. A Streptanthus species (Federal Species of Concern, *Streptanthus albidus* ssp. *peramoenus*) also occurs on the LECEF Ecological Preserve, however, the Federal endangered species, *S. albidus* ssp. *albidus* was not observed. Ongoing monitoring is being proposed to support management of the LECEF Ecological Preserve for listed plants. Coyote ceonothus and Tiburon paintbrush are not expected to occur on the preservation parcel (pers. comm. Weiss 2004), although suitable habitat and known populations occur on the southern portion of Coyote Ridge (USFWS 1998, Figure 4). Host plants for Bay checkerspot butterfly were also observed on the preservation site.

The general conclusion of the initial assessment of the LECEF Ecological Preserve was that it has intrinsic value for habitat and does contain one of the plants listed in this HCP, the Santa Clara Valley dudleya. This conclusion was based on the fact that the site supports all the elements for Bay checkerspot butterfly habitat and that it has supported butterflies and larvae in the early 1990s and more recently during the 2002 and April 2005 initial surveys. Detailed plant information for the LECEF Ecological Preserve will be developed as part of the regular monitoring and reporting program under this HCP, as described below.

5.3 Preserve Management

Management of serpentine grasslands has two primary objectives: to control invasive non-native plants and to foster the preservation of native grassland plant communities. In order to favor the existence of native plants (especially host plants for the Bay checkerspot butterfly), it is necessary to control the spread of non-native annual grasses. If this is not done, competition with native plants for water, light, and nutrients can be expected to result in increased biomass (and seedbank) of the invasive species. The increased biomass would also increase deposition of organic matter from plant detritus, resulting in an increase in soil fertility that would further favor the invasive plants. Removal of biomass though grazing is necessary to assure the long-term stability of serpentine bunchgrass species. Cattle grazing on Coyote Ridge, including the LECEF Ecological Preserve, is currently ongoing by agreement with a rancher familiar in the requirements of endemic serpentine species. The

grazing regime (i.e., when to place cattle on the land and when to remove them) is currently determined by Dr. Weiss.

Even though levels of vegetative diversity and native species dominance remains are relatively high on Coyote Ridge, non-native annual grass species have become naturalized and will persist even under management designed to remove their biomass over the long term. Previous experiences with management and restoration of California native grasses (George et. al. 1992; Bartolome and Gemmill 1981) have shown that grasslands dominated by non-native annual grasses do not readily change towards diverse perennial bunchgrass ecosystems. Management tools need to effectively control European annual grass percent cover and biomass, and reduce competition with the host and nectar plants of the Bay checkerspot butterfly. Such tools include herbivory (grazing) in grasslands, removing standing biomass and thatch, recycling nutrients, and shifting the competitive balance between annual grasses and native bunchgrass and forb species. Where other listed serpentine endemic plant species could be selectively grazed, it will be necessary to identify those areas, which may require other means to control invasive plants without inadvertent damage to listed species.

5.3.1 Special-Status Plant Management

Special-status plant responses to grazing are species-specific. For example, many special-status species respond positively to low intensity short-duration grazing due to reduction in competition from non-native grasses, yet decline with the trampling and soil compaction associated with high intensity grazing. Other plants, such as the Santa Clara Valley dudleya, do not respond well to moderate grazing, as they are preferentially selected by grazing animals (USFWS 1998; Weiss 1999), although the plant is still thriving in areas on Coyote Ridge and Tulare Hill.

Dr. Weiss recorded the presence of all the elements required for Bay checkerspot butterfly, including host and nectar plants, on the LECEF Ecological Preserve. In addition, Santa Clara Valley dudleya was observed in rocky outcrops on the site, and at least one of the Streptanthus species was observed. A monitoring program will be implemented to track population trends and implement contingency measures, if necessary, to ensure long-term population viability.

The LECEF Ecological Preserve and other preservation sites along Coyote Ridge presents an opportunity for future efforts to establish listed plant populations from existing known populations. Because the germination and propagation requirements of the listed plants are not well understood, it is critical that potentially suitable habitats are preserved so that field trials can be undertaken by researchers to develop these techniques. The preservation lands administered by the Land Trust for Santa Clara County would be a logical place to conduct such field trials.

5.3.2 Weed Management

Based on surveys of the LECEF Ecological Preserve in January and February 2002, an invasive annual grass, Italian ryegrass (*Lolium multiflorum*), was observed at the preservation site. While not specifically identified on the site during the initial surveys, their known occurrence on nearby parcels would indicate that some amount of soft chess (*Bromus*

hordeaceus), barley (*Hordeum murinum* ssp. *leporinum*), black mustard (*Brassica nigra*), and yellow star-thistle (*Centaurea solstitialis*) could also be expected on the site. Black mustard and yellow star-thistle would likely be found in disturbed areas and road cuts and could become problematic if there was an increase in erosion or other on-site disturbance. This kind of site disturbance could allow them to become more established and to outcompete non-native annual grasses and native annuals for soil, light and water resources. Since no populations of these two species occur within the main portion of the site, host and nectar plants and listed serpentine endemic plants are not likely to be affected by these species.

Vegetative monitoring, as detailed below, has been conducted annually and will indicate what species are occurring within the sample transects. If monitoring (over the course of several monitoring events) shows that there is an increase in populations of these two species within the sample transects, the Land Trust will follow an adaptive management strategy on invasive weed control.

5.3.3 Bay Checkerspot Butterfly Management

Habitat protection is essential to the recovery of the Bay checkerspot butterfly (USFWS 1998) but land acquisition alone is not sufficient. It has been shown that butterfly populations can vary greatly from year to year due to the sensitivity of the butterfly and its host and nectar plants to weather and other factors. For this reason, responsible management of any suitable habitat preserves will also require a careful tracking of local and regional population responses to management techniques. This information must be used in an adaptive management strategy in order to adequately protect the butterfly.

An active-adaptive Bay checkerspot butterfly resource management plan, similar to the plans developed for the Kirby Canyon Landfill and the Metcalf Energy Center Ecological Preserve, has been developed for the LECEF and is included in Appendix C (see Exhibit C of this Appendix). The Management Plan is summarized below.

5.3.4 Grazing

As previous indicated, non-native annual grasses can compete with native grasses and forbs for space, light and soil nutrients in the winter and spring, and for soil moisture in late spring and summer months (Menke 1992; Holmes and Rice 1996). In addition, as the annual grasses senesce in the summer, the dead above-ground plant material accumulates as thatch on the soil surface. The presence of this thatch can suppress the germination and survival of broadleaf species (Heady 1956).

Grazing has been used as a management tool for restoration of native grasslands in California (Menke 1992), reducing competition and preventing the build up of a dense thatch layer. Grazing may be especially useful to maintain native plants in serpentine grasslands, as cattle are known to selectively graze the palatable annual grasses prefer them to forbs, such as dwarf plantain, owl's clover, and several wildflower species that serve as Bay checkerspot butterfly nectar plants (Weiss 1999; Menke 1992). In addition, Weiss (1999) has also hypothesized that cattle grazing may also remove a small amount of nitrogen from serpentine grasslands as N is volatilized and/or leached from urine and dung, and as animals are moved off site or removed for slaughter.

On the LECEF Ecological Preserve, as is practiced on other nearby preservation parcels, free ranging light-intensity/medium-duration grazing will be the primary management tool. To achieve the objective of managing non-native annual grass cover on the preservation site, grazing intensity will be will be managed to achieve some uniformity in grazing over the entire parcel without causing over or under-grazing to occur. Based on on-going grazing regimes in other serpentine areas within Santa Clara County, grazing at 1 cow/10 acres during winter/spring (typically late-February to June) has been shown to have positive effects on the host and nectar plants for Bay checkerspot butterfly (Land Trust for Santa Clara County 2004).

This same grazing regime has been implemented at the LECEF Ecological Preserve. The timing of grazing will be adjusted depending on annual weather patterns. For example, cattle will be removed early in drought years and left to graze longer in wet years. Under these grazing conditions, the habitat benefits will outweigh the low levels of mortality induced by potentially trampling larvae during the winter/spring period. The inadvertent mortality is directly proportional to the density of cattle grazing the land (Ehrlich et al. 1980), so cattle numbers and grazing intensity will be closely controlled. LECEF, LLC has provided an endowment such that this grazing management regime can continue on the preservation parcel in perpetuity.

5.3.5 Adaptive Management

Adaptive management will be utilized at the LECEF Ecological Preserve to address changing conditions that could occur at the site due to management, climatic or other environmental variations. An adaptive management strategy was developed for the site to determine actions to be taken should the biological goals and objectives listed in Section 5.0 not be met under the proposed management strategy.

This adaptive management strategy will be centered on two components: 1) monitoring of the vegetation and populations of Bay checkerspot butterflies, and 2) changes in grazing regimes. Grazing stock rates at the preservation site will be determined by the preserve managers, guided by an experienced rancher's visual assessment of the site conditions. Additionally, stock rate decisions will be based on trends observed from monitoring data. Based on on-going grazing activities on serpentine habitats within Santa Clara County, a regime of 1 cow/10 acres has been shown to balance the needs of conservation with the needs of cattle ranchers. This regime has been shown to provide enough forage for cattle to gain desired weight and promote growth of native plants including the host and nectar plants for Bay checkerspot butterfly (Land Trust for Santa Clara County 2004).

Because environmental factors change from season-to-season and year-to-year, annual grass and Bay checkerspot host and nectar plant growth will also vary. Therefore, vegetation will be monitored to assess percent cover and frequency of native species and non-native annual grasses and native species diversity. Should results of monitoring show a 25 percent increase in non-native annual grass cover over all transects, concomitant with a proportional reduction in host and nectar plant percent cover, the adaptive management strategy will be to increase grazing (increase head of cattle/acre) on the site for one or a number of years as appropriate. Should results of monitoring show an overall 25 percent decrease in total percent cover (native species and non-native grass species), or should results show an increase in bare ground cover by 25 percent over all transects, this could signify over-

grazing or a trend towards it. The adaptive management strategy for this condition would be to decrease grazing (decrease head of cattle/acre) on the site for one or a number of years as appropriate. This adaptive management plan is summarized in Table 4. Adaptive management strategies associated with changed circumstances are described in Section 9.0.

TABLE 4
Adaptive Management Plan Responses

Monitoring result change from baseline condition	Adaptive Management Strategy
Increase in percent cover of non-native grasses by 25% over all transects concomitant with a proportional reduction in host and nectar plant percentages	Increase grazing pressure (more head/acre)
Decrease in total percent cover by 25% over all transects/increase in bare ground cover by 25% over all transects	Decrease grazing pressure (less head/acre)

Another adaptive strategy will be implemented if populations of the listed plant species are discovered on the LECEF Ecological Preserve. If this occurs, all steps will be taken to protect those plants from inadvertent damage from grazing and alternate methods to clear non-native vegetation may be employed.

Additional adaptive management techniques such as vegetation mowing, fire and irrigation were considered but were rejected for the reasons noted below. Given the remote location, steep terrain, and rocky landscape of the LECEF Ecological Preserve, mowing of the site for vegetation management, would be impractical. Likewise, using fire to adjust vegetation percent cover would be difficult to manage and to obtain the needed permits. Prescription burns scheduled at the Edgewood National Preserve in 2002 were not executed due to unpredictability of weather and by directive from California Department of Forestry and Fire Protection (CDF). Note, however, that conditions may change and these techniques could become practicable or effective in the future.

Although discouraged in the past, fire and mowing are increasingly considered appropriate management tools for serpentinitic grasslands. Mowing and hay removal may also be effective, but are infeasible in the preserve area because of rock outcrops and steep slopes.

Irrigation of the preservation site during a long drought would also be considered impractical because of the high cost of setting up a functional irrigation system for potentially short periods of time. An adequate source of water does not currently exist on the site that could be used for regular irrigation. Furthermore, a water delivery system including pipeline, pumps, and distribution system would need to be set up over the entire preservation site. There is also a good chance that cattle would damage any irrigation system constructed on the ground surface.

5.4 Monitoring

5.4.1 Vegetation

There is a high degree of variation of Bay checkerspot butterfly host plant and non-native grass cover from year to year depending on climatic variability and grazing management. The purpose of the monitoring will be to track long-term, rather than short-term, changes. The monitoring data will be used to adjust grazing regimes. Nesting the vegetation monitoring transects with the Bay checkerspot butterfly larval count plots will aid in the generation of regional data that will permit correlation of the relationship between host plant densities and larval densities.

Vegetation monitoring will be accomplished by using a standard methodology developed for serpentine sites throughout the San Francisco Bay Area including the Edgewood Natural Preserve and the Metcalf Energy Center Ecological Preserve. The methodology for vegetation monitoring is described as follows:

- Approximately four 50 m transects will be established within the LECEF Ecological Preserve. The ends of the transects will be marked with rebar for repeat sampling.
- Every 5 m, a 25 cm^2 plot will be established for a total of 10 plots per transect.
- In each plot, the percent cover of the host plants, nectar plants, native grasses, and non-native grasses, as well as percent cover of bare ground or rock outcrops will be tallied by use of a scale (0, 1, 2, 5, 10, 20, 30…90 percent).
- Percent cover will be tallied per species and by total groups (host plants, nectar plants, etc.).
- Frequency (percentage of quadrats with species occurrence) and diversity (number of species per quadrat) will also be recorded.
- Vegetation will be sampled in the spring of each monitoring year.

5.4.2 Bay Checkerspot Butterfly

Topographic diversity significantly influences prediapause larval survival rates by providing a range of habitats and timing for host plants to germinate. Due to varying degrees of solar radiation, the development rate of both the butterfly and the host plants can vary by as much as a month from the cool north facing slopes and the warm south facing slopes (Murphy and Weiss 1988a, b; Weiss 1999). In most drought or mean rainfall years, survivorship will be highest in the protected north facing slopes where senescence of the annual dwarf plantain occurs later in the season, and the larvae have more time to enter diapause. In wet years, however, population increases will occur due to favorable conditions on south slopes (Ehrlich and Murphy 1987). Thus, sampling for population monitoring must be stratified by slope and aspect to develop an accurate picture of population levels.

Quantitative assessment of successful colonization/habitat use by the Bay checkerspot butterfly is difficult due to a lengthy larval diapause period (sometimes up to 1 year). In addition, there are extreme population fluctuations, with population crashes often occurring in a period of 1 to 3 years (Weiss 1999). It is therefore difficult to track trends over the short

term, determine the cause of population declines (e.g., climatic fluctuations or habitat conditions), and adjust management in time to avoid population crashes. Therefore, Bay checkerspot butterfly monitoring is most appropriate as a long-term management tool, used to evaluate long-term responses to climate and more importantly, variables under human influence such as habitat condition.

The proposed methods that will be used to survey larval Bay checkerspot butterflies occurring in the preservation site will be the same as the survey methods used on a nearby 250-acre site that is currently managed for the Bay checkerspot butterfly and listed serpentine plants for the Kirby Canyon Landfill as well as other adjacent preservation sites. The timing of the surveys will also be coordinated with surveys on other parcels. The monitoring methodology will include:

- Four 1,500 to 2,000 m^2 plots located on representative slopes present in the preservation parcel. The corners of the plots will be permanently marked with rebar for future relocation.
- Each plot will be sampled with a series of timed counts (10 person-minutes per plot) in early spring (February 15 to April 15). Using a regression developed through work at the Kirby Canyon landfill preservation site, the timed counts can be converted to larvae per unit area (assuming low numbers, correlation is 1 larvae/10 minutes = ~ 100/ha [247.11/acre]).
- Observations of adult butterflies in flight will be made in the late winter to early spring (generally starting in late February and ending in early May).

A Service-approved biologist will be engaged to complete required monitoring on the LECEF Ecological Preserve.

5.5 Reports

The monitoring year will occur from September to August. The monitoring report will be prepared and submitted to the U.S. Fish and Wildlife Service Sacramento Office and the California Energy Commission by January 30 of the following monitoring year. To simplify report preparation and regulatory review, it is proposed that the monitoring report for the LECEF project be bundled together with existing reports for the Metcalf Energy Center as both sites are managed by the Land Trust for Santa Clara County.

Baseline data will be collected for the first three years following project initiation and seasonally as shown in Table 5. Monitoring data will be collected every three years for the life of the project as in other sites on Coyote Ridge. Applying this methodology, several monitoring data points will be generated for the larger Castle & Cooke property in any given year.

TABLE 5
Baseline Data Collection Schedule for Preservation Parcels on the Castle & Cooke Property

Activity	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
1. Larval counts	--	--	--	--	X	X	X	--	--	--	--	--
2. Adult butterfly observations	--	--	--	--	--	X	X	X	X	--	--	--
3. Vegetation sampling	--	--	--	--	--	--	X	X	X	X	--	--

SECTION 6

Plan Implementation

6.1 Responsibilities

As specified in the USFWS's Habitat Conservation Planning Handbook (1996), an Implementing Agreement (IA) is not required for low-effect HCPs unless requested by the permit applicant. LECEF, LLC understands that it is responsible for implementing this HCP in accordance with the specifications for mitigation, monitoring, reporting, and funding described herein and will perform all obligations assigned to it within the Section 10 permit and the HCP.

6.2 Scope

This HCP covers incidental take resulting from those activities associated with development of the LECEF, located in the City of San Jose, California, and those activities associated with monitoring and management of the LECEF Ecological Preserve, located on Coyote Ridge, Santa Clara County, California.

6.3 Permit Holder

LECEF, LLC will be the permit holder:

Applicant:

Barbara McBride, Environmental Manager
LECEF, LLC
1200 Arcy Lane
Pittsburg, CA 94565
(925) 570-0849

6.4 Access

Biologists from the USFWS shall be given complete access to the LECEF project site, as well as to the LECEF Ecological Preserve for the Bay checkerspot butterfly and serpentine endemic plants on Coyote Ridge.

6.5 Permit Amendments/Renewal Process

6.5.1 Permit Amendments

An amendment of the LECEF Section l0(a) permit will be required for any change in the following: (a) significant revision of the permit area boundary; (b) the listing under the ESA of a new species not currently addressed in the HCP that may be taken by project activities; (c) modification of any important project action or mitigation component under the HCP,

including funding, that may significantly affect authorized take levels, effects of the project, or the nature or scope of the preservation programs; and (d) any other modification of the project likely to result in significant adverse effects to Bay checkerspot butterfly not addressed in the original HCP and permit application.

Amendment of the Section 10(a) permit would be treated in the same manner as an original permit application. Low-effect HCP permit amendments typically require a revised HCP, a permit application form and application fee, and a 30-day public comment period. However, the specific documentation needed in support of a permit amendment may vary, depending on the nature of the amendment.

6.5.2 HCP Amendments

An HCP may, under certain circumstances, be amended without amending the associated permit, provided that such amendments are of a minor or technical nature and that the effect on the species involved and the levels of take resulting from the amendment are not different than those described in the original HCP and covered in the permit. Actions that may result in a minor amendment include: correction of mapping errors, modifying avoidance or minimization measures (such as timing that do not result in additional take), modifications to annual reports, minor changes to the monitoring protocols, or a reduction in the size or scope of the covered activities.

To amend the HCP without amending the permit, LECEF, LLC must submit to the USFWS, in writing, a description of: (1) the proposed amendment, (2) an explanation of why the amendment is necessary or desirable, and (3) an explanation of why the Applicant believes the effects of the proposed amendment would not be significantly different than those described in the original HCP. The HCP amendment shall be considered effective upon the date of the USFWS's written authorization.

Major amendments are those that result in more than a minor or technical change (i.e., significant modifications to the HCP that were not previously analyzed). Actions that would result in a major amendment include: modifying the incidental take permit, revisions to the NEPA documents, changes in funding, changes in the covered activities not previously addressed in the HCP, or changes to the permit boundaries.

6.5.3 Permit Renewal

The Section 10(a)(1)(B) permit may be renewed without the issuance of a new permit, provided that the permit is renewable, and that biological circumstances and other pertinent factors affecting the covered species are not significantly different than those described in the original HCP, and the USFWS receives the request at least 30-days prior to the permit's expiration. To renew the permit, the Applicant shall submit to the USFWS, in writing: (1) a request to renew the permit; (2) reference to the original permit number; (3) certification that all statements and information provided in the original HCP and permit application, together with any approved HCP amendments, are still true and correct, and inclusion of a list of changes; (4) a description of any take that has occurred under the existing permit; and (5) a description of any portions of the project still to be completed, if applicable, or activities under the original permit the renewal is intended to cover.

If the USFWS concurs with the information provided in the request, it shall renew the permit consistent with permit renewal procedures required by federal regulation (50 CPR 13.22). If LECEF, LLC files a renewal request and the request is on file with the issuing USFWS office at least 30 days prior to the permits expiration, the permit shall remain valid allowing LECEF, LLC to take listed species beyond the authorization by the original permit. If LECEF, LLC fails to file a renewal request within 30 days prior to permit expiration, the permit shall become invalid upon expiration.

6.6 Public Input

Under the Endangered Species Act, provisions are made for public review and comment for all HCPs. In general, there is a 60-day public comment period for HCPs. Low-effect HCPs and HCP amendments typically have a 30-day public comment period. Public comment periods typically begin after the USFWS and NOAA Fisheries notify the public of the availability of the HCP for review. The notification occurs in the Federal Register. When practicable, the USFWS and NOAA Fisheries will also seek to announce the availability of the HCP in local newspapers and in electronic formats.

6.7 Funding

The following actions were initiated as part of the guarantee of management in perpetuity and to provide assurances of funding for such management in perpetuity. LECEF has reached an agreement with the Land Trust for Santa Clara County (Land Trust) for management of the LECEF Ecological Preserve associated with this HCP (included as Appendix B). LECEF, LLC has purchased 40 acres of preservation land from Castle & Cooke, Inc. The Land Trust has agreed to manage the preservation land and implement the HCP in perpetuity. LECEF, LLC in turn has paid $517,929 to be used to fund the initial and ongoing capital costs to manage the LECEF Ecological Preserve. LECEF, LLC initially provided the Land Trust with $46,509 deposited into an Operating Account to fund short-term expenses, such as capital improvements and other initial tasks. The remaining $471,420 was placed into a segregated endowment account with a bank, securities firm, or other institutional entity with fiduciary responsibilities and investment capabilities. The intent is that the endowment account will be invested so that, together with the dividends and interest thereon, the revenue will be sufficient to cover the Land Trust's ongoing management expenses "in perpetuity". LECEF, LLC has also agreed to pay $5,000 toward the Land Trust's administrative closing costs.

The initial amount of the Endowment Fund is based upon the final Property Analysis Report (PAR). It was agreed by both parties, LECEF, LLC and the Land Trust, that the PAR provides only the basis for determining the amount of the Endowment Fund initially contributed by LECEF and that the PAR shall not be subject to later revisions even though the assumptions and information upon which the PAR is based may change over time.

The annual operating costs were determined by the Land Trust based on their existing operation of similar sites in the vicinity and include ongoing tasks such as biotic surveys and reporting, general maintenance, exotic plant control and office operations. Upon execution of the agreement, both Parties confirmed that it is their mutual belief that the

amount of the Endowment Fund, if supplemented as required under the terms of the Agreement, should be adequate to finance the monitoring and perpetual management and maintenance of the LECEF Ecological Preserve.

SECTION 7

Alternatives

A detailed alternatives analysis is provided in Section 9.0 of the LECEF AFC (LECEF, LLC 2003). The alternatives that were evaluated are summarized below:

7.1 No Project Alternative

A **"No Project" alternative** was considered and rejected. The "no project" alternative would consist of ceasing operation of the LECEF Phase 1 and not developing Phase 2. This would mean forfeiting the electrical generation from the project and require that it be made up from other generating sources, likely to be less efficient and more polluting, to meet demand for reliable power supply.

A "No Project" alternative was considered and rejected for Phase 1 because not licensing the continued operation of the project would involve the waste through non-use of a valuable electrical generating asset. Also, the "No Project" alternative for Phase 1 would result in the Applicant violating the terms of the Power Sales Agreement with the California Department of Water Resources. Finally, the "No Project" alternative would require the U.S. DataPort Project, when built, to use electricity from the grid, which puts the project in conflict with the City of San Jose's California Environmental Quality Act (CEQA) decision to have the project be electrically self-sufficient.

The "No Project" alternative for Phase 2 was considered and rejected. The "No Project" alternative would not meet the State of California's objective to license the most efficiently running power plants possible, as intended under PRC § 25552. The Phase 2 conversion would boost the installation's efficiency from 38 to 46 percent, a considerable increase. Conversion of waste-heat to additional energy through the addition of a steam turbine generator is the only alternative that would meet the Applicant's goal of generating additional energy efficiently.

Potential environmental impacts from the "No Project" alternative would result in greater fuel consumption and air pollution because new generating facilities, such as the project, would not be brought into operation to displace production from older, less efficient plants with dramatically higher levels of pollution causing air emissions. The displacement of diesel-fired back-up generators (DBUGs) that are currently in use is important because of their significant threat to air quality and public health.

The "No Project" alternative does not eliminate reductions in Bay checkerspot butterfly and serpentine endemic plant habitat that currently occurs in the Bay Area and would not result in the acquisition of land for use in preserving these species.

7.2 Alternative Site Location Alternative

Similarly, **alternative Site Locations** were considered for the LECEF. In summary, there were three primary reasons for selecting the site. The first reason for selecting the project site is its proximity to the U.S. DataPort Development [Rezoning and Prezoning] Project. The second reason is that the location is close to where there are large demands for electricity. The third reason is the proximity to all the required interconnecting facilities (natural gas, electrical transmission, and recycled water), which minimizes both environmental impacts and costs, and allows for a shorter construction period and more immediate relief to California's energy crisis.

In addition, land uses surrounding the project site are compatible with the continued operation of Phase 1 and the development of Phase 2. These include the San Jose/Santa Clara Water Pollution Control Plant and its sludge drying ponds and buffer lands, the PG&E Los Esteros Substation, the SVP Switching Station, and various industrial and office uses south and east of the project site. The project site, furthermore, would not cause significant visual and noise impacts due to the distance from residences and other sensitive land uses. In addition, LECEF is consistent with the City of San Jose Industrial General Plan designation and the Planned Development zoning specifically adopted by the City of San Jose for the US DataPort project and the LECEF. Since Phase 1 was approved and constructed and is currently operating on this site, there are no reasonable alternative sites for Phase 1. Phase 2 must be built within close proximity to Phase 1, and in fact, provisions were made to include Phase 2 within the 21-acre parcel were made when developing Phase 1. Thus, there are no reasonable alternative sites for the location of Phase 2.

Alternative site locations would have no direct effect on reducing 'take' of listed species because the range of sites considered are all outside of associated serpentine habitats. The anticipated indirect 'take' of listed species from emissions would be essentially equal no matter which site was chosen, as long as it was within the same airshed.

7.3 Alternative Project Configuration Alternative

Alternate Project Configurations were also considered. The present nominal 180-MW configuration of Phase 1 was the result of a wide array of design and operating considerations. The main factors that affected the configuration included available gas turbine-generator sizes, economies of scale for both construction and operation of the plant, fuel supply logistics, power transmission capacities, and forecast market demand for merchant plant power. The present configuration consists of the latest generation of commercially demonstrated combustion turbine technology.

The proposed configuration for Phase 2—including the addition of HRSG tube sections and associated evaporator drums and piping, HRSG duct burners, a nominal 140 MW steam turbine generator, a six-cell cooling tower, and ancillary equipment—was the result of a wide array of design and operating considerations. The main factors that affected the configuration included available steam turbine generator sizes, economies of scale for both construction and operation of the plant, fuel costs and fuel efficiency, power transmission capacities, and forecast market demand for merchant plant power. The proposed

configuration consists of the latest generation of commercially demonstrated steam turbine technology.

It is believed that the current project configuration is the most efficient with the highest power output and lowest emission impacts of the commercially viable alternatives. For this reason, the chosen configuration is anticipated to help minimize 'take' of the listed species.

7.4 Alternative Technologies Alternative

Alternate Technologies were also considered. As a merchant plant, the project will be competing with other electricity generators in selling electricity in a deregulated market. The ability of the Phase 1 project to continue meeting its obligations under the CWDR contract is paramount to the success of the project and the generating technology to be used for the project has therefore been carefully selected. Numerous alternative technologies were considered for Phase 1 of LECEF as described in the Phase 1 AFC (CH2M HILL 2001). Since Phase 1 has been approved and constructed and is currently operating as a natural gas-fired simple-cycle generating facility, no reasonable alternative technologies to meet the goal of continued operation of Phase 1 have been identified.

The conversion of LECEF to a natural gas-fired combined-cycle generating facility (Phase 2) would meet the State of California's objective to license the most efficiently running power plants possible, as intended under PRC § 25552. Conversion of waste-heat to additional energy through the addition of a steam turbine generator is the only alternative that would meet the Applicant's goal of generating additional energy efficiently. The combustion turbines presently exhaust hot combustion gas to the atmosphere, but in the combined cycle technology, the exhaust gas would be passed through a heat recovery steam generator thereby creating steam to drive a steam turbine/generator. The resulting efficiency for the system would increase from 38 to 46 percent, considerably above most other alternatives. This relative high efficiency would result in relatively low air emissions per kilowatt-hour generated and a relatively low cost per kilowatt-hour. In addition, natural gas fuel emits little sulfur dioxide and little particulate matter. Combined-cycle technology is commercially available and feasible for use. Because of its high efficiency and low cost of generation, this technology is best suited for LECEF.

Other uses of the facility's waste heat would involve export of process steam, for which it would be necessary to have a nearby steam host. Such a host is currently not available near the facility site. In addition, Phase 1 was approved and constructed to accommodate expansion of the project to combined-cycle operation. The use of another technology would waste through nonuse the facilities already in place to accept Phase 2 and so no other alternative technologies were identified for Phase 2.

As was determined for the consideration of alternate configurations, it is believed that the choice of the preferred project technologies will help to minimize indirect 'take' of the listed species.

SECTION 8

Changed and Unforeseen Circumstance

8.1 Changed Circumstances

Section 10 regulations [50 CFR 17.22 (b)(2)(iii)] require that an HCP specify the procedures to be used for dealing with changed or unforeseen circumstances that may arise during the implementation of the HCP. In addition, the Habitat Conservation Plan Assurances ("No Surprises") Rule [50 CFR 17.21 (b)(5)-(6) and 17.22 (b)(5)-(6); 63 F.R. 8859] defines "unforeseen circumstances" and "changed circumstances" and describes the obligations of the permittee and the USFWS.

The purpose of the Assurances Rule is to provide assurances to non-Federal landowners participating in habitat conservation planning under the ESA that no additional land restrictions or financial compensation will be required for species adequately covered by a properly implemented HCP, in light of changed or unforeseen circumstances, without the consent of the permittee. "Changed circumstances" means changes in circumstances affecting a species or geographic area covered by the conservation plan that can reasonably be anticipated by plan developers and the USFWS and that can be planned for (e.g., the listing of a new species, fire, increased precipitation, drought, and minor erosion). The policy defines "unforeseen circumstances" as changes in circumstances that affect a species or geographic area covered by the HCP that could not reasonably be anticipated by plan developers and the USFWS at the time of the plan's negotiation and development and that result in a substantial and adverse change in status of the covered species (e.g. natural catastrophic events).

The changed circumstances for this site are reasonably foreseeable events such as fires, floods, or droughts that have an effect on habitat requiring a management response. These items are addressed below.

8.1.1 Fire

Lightning-caused natural fires in Santa Clara County occur once in every 200 years for every 1,000 hectares (Keeley 002). Human-caused fires are more common but since there is no public access to the site and it is not immediately adjacent to public roads there is small potential for such human-caused fires. Consequently, a fire-return interval of greater than 30 years is considered to be conservative and is used here.

Fire is a natural component of California grassland ecosystems. The frequency and intensity of fire is highly variable. For an estimate of drought frequency, this HCP relied on the analysis conducted for the larger Santa Clara Valley HCP/NCCP (Valley Plan) (which is currently in draft). Fire history data indicate for Santa Clara County indicates that the average number of fires per year over the last 50 years is less than one (0.58) and the average size was 975 acres. In the event of a fire, the Permittee will follow protocols established in the vegetation management plans and will work closely with local fire response crews to ensure that impacts to the preserve area and the covered species are minimized. In

addition, landscape-level monitoring will assess changes to land cover type, and natural community–level monitoring will assess the response of invasive plants. In conjunction with the USFWS, through adaptive management, the Permittee will modify the vegetation management plan by adjusting the timing or type of vegetation management activities (i.e., graze or mow earlier or later in the season).

Management Response: Fire would reduce the grass cover of the site and would likely result in death or injury of some individuals. However, fire is recognized as an important management tool in restoring native California grasslands and is not expected to have long term detrimental effects to Bay checkerspot butterfly habitat. In the short term fire would reduce larval food plants and adult nectar plants, but these effects would be temporary in nature and generally these species are known to have a positive response to fire during the following growing season. The reduced grass cover would result in less cattle forage. Consequently, the management response would be to evaluate the extent of the fire, the reduction in forage availability and then to adjust cattle grazing intensity and grazing period for the observed conditions. Additional management responses may include reseeding with a native seed mix (that includes larval host and adult nectar plants), assessment of the area damaged by fire, and implementation of erosion control measures.

8.1.2 Drought

Over the last several centuries there have been both protracted and short interval droughts in the Bay Area (e.g., San Francisco Estuary Institute 2001, Figure 13). Over the last hundred years dry periods from about 1944 to 1968 with relatively wetter periods from 1968 to 1995 but with a drought period from 1987 to 1992 have been observed plus the substantial precipitation events in 1996 and 1998 (San Francisco Estuary Institute 2001, Figures 13, 14, 15). Therefore, dry conditions are likely to occur during the 30-year permit period. However, the periods of drought this site is likely to experience are not out of the ordinary and are within the range of conditions and variability the local species are adapted to.

Management Response: Periods of drought would likely reduce the grass cover of the site but would not be expected to have detrimental effects to Bay checkerspot butterfly habitat. The reduced grass cover would result in less cattle forage. Consequently, the management response would be to evaluate the extent of the forage reduction and then to adjust cattle grazing intensity and grazing period for the observed conditions. The site currently supports host plants and Bay checkerspot butterflies despite the 1987 to 1992 drought, no management response to normal droughts are required.

8.1.3 Wet Periods

As noted in the discussion of drought above, wetter periods than climatic average are likely to occur. Although part of the natural fluctuation in climate, such wet periods could also result in increased vigor of non-native grasses and they could expand into areas of the Bay checkerspot butterfly host plants.

Management Response: The expanded grass cover would result in more cattle forage. Consequently, the management response would be to evaluate the extent of the forage increase and then to adjust cattle grazing intensity and grazing period for the observed conditions.

8.1.4 Floods and High-intensity Rainstorms

Floods will not affect the site because its slope is sufficiently high to prevent flooding except for minor flow height increases in the small existing channels on the slope. In 2009, a high intensity October rain storm resulted in significant erosion of a nearby gravel access road that resulted in reduced access for a few weeks. This is the only recorded incident of significant erosion in the area despite many years of cattle grazing but this condition will be continually assessed through the ongoing monitoring.

Management Response: The site does not exhibit any apparent surface erosion effects despite substantial rainfall events in the recent past (e.g., in 1982 and in 1996 and 1998 [San Francisco Estuary Institute 2001, Figure 15]). Additionally, no mass movements were identified at the site associated with the 1982 event and the landslides mapped in the serpentine units are associated with larger, steep inner canyons that do not occur on the site. Consequently, no changed circumstances associated with flooding or extreme rainfall events are anticipated that will require a management response as long as overall management remains similar to the last decades. In the event that access to the site is restricted due to floods or high-intensity rain events, access to the site will be restored.

8.1.5 New non-native or Invasive Species

The introduction of a new (not known to historically occur within the area) invasive plant or animal species that could threaten the habitat, host plants, nectar plants or individuals of Bay checkerspot butterflies is considered a changed circumstance. In addition, the introduction of a disease that would affect Bay checkerspot butterflies (all stages) or their host and nectar plants is also considered a changed circumstance. Barbed goatgrass (*Aegilops triuncialis*) is a new invasive annual grass that was recognized as a problem in 2005. Other new non-native or invasive species are likely to occur over the 30-year permit term.

Management Response: The adaptive management plan will be reviewed and updated as necessary to manage the new species. Additional actions may consist of handpulling, changes in grazing regime (i.e., timing or grazing animal), mowing, or prescribed fire. Limited pesticide application that does not result in take of listed species may be included in a revised management plan.

8.2 Unforeseen Circumstances

The USFWS shall consider, but not be limited to, the following factors when determining whether any event constitutes an unforeseen circumstance: the size of the current range of the affected species; the percentage of the range adversely affected by the HCP; the percentage of the range conserved by the HCP; the ecological significance of that portion of the range affected by the HCP; the level of knowledge about the affected species and the degree of specificity of the species' conservation program under the HCP; and whether failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of the affected species in the wild.

If the USFWS determines that the unforeseen circumstance will affect the outcome of the HCP, additional conservation measures may be necessary. Where the HCP is being properly

implemented and an unforeseen circumstance has occurred, the additional measures required of the permittee must be as close as possible to the terms of the original HCP and must be limited to modifications within any conserved habitat area or to adjustments within lands or waters that are already set aside in the HCP's operating conservation program. Additional conservation measures shall not involve the commitment of additional land or financial compensation or restrictions on the use of land or other natural resources otherwise available for development or use under the original terms of the HCP without the consent of the Permittee. Resolution of the situation shall be documented by letters between the USFWS and LECEF, LLC.

Thus, in the event that unforeseen circumstances adversely affecting the Bay checkerspot butterfly occur during the term of the permit, LECEF, LLC would not be required to provide additional financial investments or additional land use restrictions above those measures specified in the HCP, provided that the HCP is being properly implemented. This HCP expressly incorporates by reference the permit assurances set forth in the Habitat Conservation Plan Assurances ("No Surprises") Rule adopted by the USFWS and published in the Federal Register on February 23,1998 (50 CFR Part 17).

Except as otherwise required by law or provided for under the HCP, including those provisions regarding Changed Circumstances, no further preservation measures for the effects of the proposed project on the Bay checkerspot butterfly may be required from a Permittee who is properly implementing the terms of the HCP and the Permit. The HCP will be properly implemented if the commitments and provisions of the HCP and the permit have been or are being fully implemented by the Permittee (LECEF, LLC).

Other unforeseen, or very unlikely circumstances, are those sufficiently beyond changed circumstances that they do not need to be included in an adaptive management/changed circumstances plan. Among the events considered as unforeseen circumstances are: a magnitude 8 or similar earthquake that prevents access to the site for an extended period so that some planned management activity cannot be completed, a somewhat speculative greater than 200-year rainfall intensity event that causes extensive surface erosion that has not been previously experienced at the site,

SECTION 9

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APPENDIX A

Location of LECEF Ecological Preserve

APPENDIX B

Environmental Assessment Summary

APPENDIX C

Land Management and Endowment Agreement

APPENDIX D

Initial Assessment of Proposed Mitigation Lands